



ICCET 2026

PROCEEDINGS OF

**14th International Conference on Contemporary
Engineering and Technology 2026**

22nd & 23rd March 2026 / Chennai, India

ISBN: 978-81-986418-1-6



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**14th INTERNATIONAL CONFERENCE ON
CONTEMPORARY ENGINEERING AND TECHNOLOGY
(ICCET – 2025)**

March 22nd – 23rd, 2026

ORGANIZED BY

**ORGANIZATION OF SCIENCE AND INNOVATIVE
ENGINEERING & TECHNOLOGY (OSIET).**

Chennai, India.

Website: www.ijsiet.org

In Association with

**PRINCE SHRI VENKATESHWARA PADMAVATHY
ENGINEERING COLLEGE**

**PRINCE DR. K. VASUDEVAN COLLEGE OF ENGINEERING
AND TECHNOLOGY**

Medavakkam - Mambakkam Road, Ponmar, Chennai – 600 127

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In Collaboration

Samarkand State University

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ICCET 2026

Proceeding of 14th International Conference on Contemporary Engineering and Technology

22nd & 23rd March, 2026

Organized by:

Organization of Science and Innovation Engineering & Technology

4/3, Vallalar Street, Choolaimedu, Chennai – 600094

Venue:

Prince Shri Venkateshwara Padmavathy Engineering College
Prince Dr. K. Vasudevan college of Engineering and
Technology Medavakkam - Mambakkam Road, Ponmar,
Chennai – 600 127

ISBN: 978-81-986418-1-6

Published at: Chennai



CHAIRMAN'S MESSAGE

I am delighted to welcome you all to the International Conference on “Contemporary Engineering and Technology” (ICCET 2026) which brings together experts and academics from around the world. The conference this year has brought together a tremendous and rich diversity of authors and speakers from universities, government and industry to share ideas and new perspectives on a wide range of Communications, Electronics, Networking, Computer Science, Mechanical and Electricals research and technologies. Addressing the new technical and business issues are essential to advance in today's engineering and technological environments. In order to provide an outstanding technical level for the presentations at the conference, we have invited more than 15 distinguished experts in the Engineering and Technology field to participate in the Advisory Committee. Academic excellence has always been the hall mark of our institute and we are committed to provide a comprehensive education which seeks to develop the students into academically proficient, morally upright and socially well integrated individuals. I would like to express my thanks to all authors for their outstanding contributions and in particular the members of the program board for their competent evaluation of the large number of submissions

We are very pleased with the quality, depth, and breadth of this year's technical program. I wish you a most enjoyable experience at the Conference.

Dr.K.Vasudevan

Chairman

Prince Group of Educational Institutions

VICE CHAIRMAN'S MESSAGE



The words “Engineering” and “Technology” are not just words but are vital disciplines that guide the world by bringing huge changes to the current way of living. Modern Engineering and Technological innovations are making people think that nothing is impossible in this world. Everything can be achieved with an extremely powerful vision and a path to attain that vision. If a person is doing a marvel, keep in mind that you too can outshine them with perseverance. Dr. A. P. J Abdul Kalam said “Dream is not something that comes when you sleep, it is something that doesn’t let you sleep”, so, dream a lot about how to bring changes and try to make the changes come true. Remember earning money is not life; it is just a part of life which can be easily earned when you do it with dedication. Science and technology have become so closely intertwined, and I hope the conference will help you to reinforce each other.

We are very much elated in welcoming you all to our college for the 14th International Conference on Contemporary Engineering and Technology and I wish the students all the very best for their presentations.

Dr. V. Vishnu Karthick,

Vice Chairman,

Prince Shri Venkateshwara Padmavathy Engineering College.

ADMINISTRATIVE OFFICER'S MESSAGE



The world is growing fast in fact it grows in such a way that a thing invented yesterday becomes obsolete today, which means there is a plethora of competition in each and every discipline of engineering and technology. This scenario goes well with a famous quote of a philosopher Heraclitus, who said, “Change is the only constant in this world.” Now a days people need new inventions for their daily works so that they can do it with ease. People not only need to do their activities with ease but they also need it to be done within a period of time. As an engineer we need to solve problems that are left unsolved. As a way of showcasing the talents of young minds to find solutions we have organised this 14th International Conference on Contemporary Engineering and Technology.

I welcome you all to this event, my warm wishes to the students who are going to present their papers and also hearty thanks for the staff who have made this event a great success.

Er. K. Parthasarathy

Administrative Officer

Prince Group of Educational Institutions

PRINCIPAL'S MESSAGE

I express my happiness to meet you through this 14th International Conference on Contemporary Engineering and Technology (ICCET 2026). I am much delighted to convey my warm greetings to the Guests and the Host. We, at Prince Shri Venkateshwara Padmavathy Engineering College and Prince Dr. K. Vasudevan College of Engineering and Technology, Ponmar, Chennai impart futuristic technical education and instil high pattern of discipline. Education is sweeter and valuable when it promotes the blossoming of natural talent that enriches students to be self reliant individuals. The scenario of technical education in India is now in a transformational phase as compared to earlier times. We are in a compelling era where global conditions require conventional practices which make one to change and adapt to suit the present requirements and also address futuristic needs. The college is committed in enhancing the quality of service delivery, providing practical cum industrial-oriented programs and ensuring a valuable campus environment for the faculty and students. With the support of the Management, faculty members, staff and students are excelling in their work. The holistic and comprehensive education provided in the College will enlighten the students and enable them to face the challenging world. Research is the key parameter to promote the individuality to horizon. In order to create the best engineers we have organized the international conference to enhance the research activities of the budding engineers.

This proceeding of the conference has been documented with utmost care. I believe strongly that, this will stand as a great source of knowledge and researchers. With immense pleasure and pride, I welcome all the participants and convey my best wishes for ICCET 2025.

Dr. G Indira
Principal
Prince Shri Venkateshwara Padmavathy Engineering College

PRINCIPAL'S MESSAGE



I am indeed most delighted to chair this 14th International Conference on Contemporary Engineering and Technology (ICCET 2026). The sharp, clear sighted vision and precise decision making powers of our management has benefited our college to stay competitive. The Pedagogy at the Institute is Modern where a variety of learning, behavioural tools are used in quality pursuance of knowledge, development of skills, attitudes, and values complemented by academia-industry interface imparting uniqueness to our programme. The Institute focuses on the holistic development of its students through variety of methodologies and extracurricular activities the whole year round. Today, we live in an era of incredibly rapid technological change. Technology has dominated our lives and we now have the ever evolving technology at our finger tips. Symposium, Seminars and International Conferences and Workshops are organized in the institute for their overall development. Teaching and Research are the two primary activities through which we fulfil our Mission and Objective. The Institute takes pride in welcoming the National and International participants for 14th International Conference.

With a firm foundation of the past and high hopes for a bright future, I wish everyone good luck and prosperity ahead. May we grow many technological wings!

Dr. T.Sunder Selwyn

Principal

Prince Dr. K. Vasudevan College of Engineering and Technology.

ABOUT INSTITUTION

Prince Educational Society was established in 1978 by our Founder - Chairman Dr. K. Vasudevan, M.A., B.Ed., Ph.D. Going down memory lane in the seventies, our Chairman had realized the need for an Institution which will serve as a role model and stand apart from other Educational Institutions.

VISION

The main aim of Prince Shri Venkateshwara Padmavathy Engineering College & Prince Dr. K. Vasudevan College of Engineering & Technology is to meet the challenges and demand of the highly advanced scientific and technological fields and to prepare to meet the man power needs of the world.

MISSION

To provide goal-oriented, quality-based and value-added education through state-of-the-art technology on a par with international standards. To promote nation - building activities in science, technology, humanities and management through research. To create and sustain a community of learning that sticks on to social, ethical, ecological, cultural and economic.

OUR GROUP OF INSTITUTIONS

Prince Shri Venkateshwara Padmavathy Engineering College

Prince Dr. K. Vasudevan College of Engineering & Technology

Prince Shri Venkateshwara Arts and Science College

Prince Matriculation Higher Secondary School 7, Kannagi Street, Madipakkam to Puzhuthivakkam, Chennai 091

Prince Sri Vari Vidyalaya CBSE School, 93, College Road, Nanganallur, Chennai 114.

Prince Sri Vari Vidyalaya CBSE School, 12, Kannagi Street, Madipakkam to Puzhuthivakkam, Chennai 91

Shri Venkateshwara Higher Secondary School, 9, Kannagi Street, Madipakkam to Puzhuthivakkam, Chennai 91

Prince Matriculation Higher Secondary School, 67&68, College Road, Nanganallur, Chennai 114



MANIPAL
UNIVERSITY COLLEGE
MALAYSIA



Greetings to all esteemed faculty, researchers, industry leaders, and students attending the 14th International Conference on Contemporary Engineering and Technology (ICCET 2026) at Prince Shri Venkateshwara Padmavathy Engineering College, Chennai, India. I am honored to be delivering the keynote address at this prestigious event on March 22nd & 23rd. This conference is a platform to explore the new innovations and trends shaping the landscape of engineering and technology. This conference fosters a dynamic environment where all researchers can engage in thought-provoking discussions, share ground-breaking research findings, and forge meaningful collaborations. These interactions will undoubtedly spark innovation and propel us towards a future brimming with possibilities.

I am eager to connect with all of the delegates and witness the innovative ideas that emerge from this vibrant gathering. Together, let us push the boundaries of knowledge and create a future where engineering, technology, and management work in harmony for the betterment of our world.

I look forward to a stimulating and productive conference!!

DR. SUGAPRIYA DHANASEKARAN
PROFESSOR, DEPARTMENT OF MICROBIOLOGY
MANIPAL UNIVERSITY COLLEGE MALAYSIA
MELAKA, MALAYSIA

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640	ICCETPV260175	MACHINE LEARNING BASED FAULT DIAGNOSIS OF ELECTRIC DRIVES
641	ICCET262786	IOT - BASED LORA-ENABLED SAFETY MONITORING SYSTEM FOR MINING WORKERS
642	ICCETPV260055	DECENTRALIZED BLOCKCHAIN-BASED FUND MANAGEMENT SYSTEM FOR TRANSPARENT AND SECURE MEDICAL TRANSACTIONS
643	ICCET262876	DESIGN OF HIGH GAIN WEARABLE VIVALDI ANTENNA FOR BIOMEDICAL APPLICATIONS
644	ICCETPV260078	AGENTIC AI IN QUICK DIGITAL COMMERCE: A REVIEW AND RESEARCH OUTLOOK
645	ICCETPV260217	IOT-ENABLED SMART SERVICE AND PRODUCT MANAGEMENT SYSTEM
646	ICCET262602	DIGITAL TWIN DRIVEN EXPERIMENTAL FRAMEWORK FOR BEHAVIORAL ANOMALY DETECTION IN SMART OFFICE NETWORKS
647	ICCET262922	MULTI-DISEASE PREDICTION USING CLINICAL BIOMARKERS
648	ICCETPV260588	REHAWALK: SMART PARALLEL BARS WITH MOTION FEEDBACK FOR THERAPY
649	ICCET261316	AN AI-POWERED NATURAL LANGUAGE INTERFACE FOR REAL-TIME DATABASE OPERATION
650	ICCET262753	PERSON RE-IDENTIFICATION USING DEEP LEARNING
651	ICCET262810	DESIGN AND IMPLEMENTATION OF AN ECONOMICAL SOLAR WATER PUMP WITH GRID AND BATTERY BACKUP FOR CONTINUOUS OPERATION USING ANN CONTROLLER
652	ICCET261217	NURTURE MONITOR A CONTACTLESS MULTI-SENSOR EMBEDDED SYSTEM FOR EARLY DETECTION OF SIDS RISK FACTORS
653	ICCET2622597	A SOLAR POWERED UNDERWATER INDUCTIVE WIRELESS POWER TRANSFER SYSTEM IN MARINE APPLICATION
654	ICCETPV260606	DEVELOPING A TRANSPARENT ANEMIA PREDICTION MODEL EMPOWERED WITH EXPLAINABLE ARTIFICIAL INTELLIGENCE
655	ICCET262777	GEO-FENCED EV CHARGING SYSTEM USING IOT
656	ICCETPV260703	AN ADAPTIVE SPATIOTEMPORAL MULTIMODAL FUSION FRAMEWORK WITH CONTEXTUAL SEMANTIC RECONSTRUCTION FOR ASSISTIVE COMMUNICATION
657	ICCET2622583	WOMEN SAFETY APPLICATION: REAL-TIME VOICE ANALYSIS FOR EMERGENCY RESPONSE
658	ICCET261993	FABRICATION AND TESTING OF SOLAR POWERED WATER AND AIR PURIFIER
659	ICCET262895	IOT-BASED PATIENT HEALTH MONITORING SYSTEM FOR HOSPITALS AND REMOTE AREAS
660	ICCET261985	FABRICATION OF VOICE CONTROL WHEELCHAIR FOR PHYSICALLY DISABLED PEOPLE
661	ICCETPV260163	REAL-TIME FACIAL EXPRESSION RECOGNITION USING A HYBRID YOLOV8 AND TINY-VIT MODEL
662	ICCETPV260059	EVALUATION OF RE-IDENTIFICATION RISKS AND PRIVACY ENHANCEMENT FRAMEWORKS FOR NATIONAL STATISTICAL MICRODATA
663	ICCET262683	PHARMALEDGER:A DECENTRALISED DRUG TRACEABILITY AND COMPLIANCE FRAMEWORK USING BLOCKCHAIN
664	ICCETPV260795	MACHINE-LEARNING-ASSISTED HYBRID ACTIVE AND PASSIVE NOISE CONTROL BARRIER FOR URBAN NOISE SUPPRESSION
665	ICCETPV260145	HEARTFORMER A LIGHTWEIGHT TRANSFORMER FOR ECG CLASSIFICATION
666	ICCET262737	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING-BASED DISEASE PREDICTION AND PERSONALIZED DIET RECOMMENDATION SYSTEMS: A SYSTEMATIC REVIEW
667	ICCETPV260126	GENETIC RISK FACTOR IDENTIFICATION
668	ICCET262799	REALISTIC AI-GENERATED CONTENT DETECTION AND CLASSIFICATION

669	ICCETPV260060	REAL-TIME MULTI-AGENT EXERCISE MONITORING WITH VOICE-GUIDED FEEDBACK
670	ICCET262784	REAL-TIME LOAD VARIATION MONITORING AND OVERLOAD ALERT SYSTEM USING IOT
671	ICCET260207	A MULTI-MODEL AI FRAMEWORK FOR EARLY DISEASE DETECTION USING SYMPTOM ANALYSIS AND MEDICAL IMAGE CLASSIFICATION
672	ICCETPV260303	UNDERWATER NAVIGATION SYSTEM USING SENSOR FUSION AND MACHINE LEARNING
673	ICCETPV260088	CDNA-CSS : A CHAOTIC DNA CRYPTOGRAPH ARCHITECTURE FOR CLOUD COMPUTING SECURITY BASED ON SPLITTING AND COMPRESSION
674	ICCETPV260056	DYNAMIC MULTIPHASE ARCHITECTUREFOR IDENTIFYING AND MITIGATION DDOS ATTACKS IN SDN-BASED FOG-POWERED IOT NETWORKS
675	ICCET262892	KIDNEY TUMOR IDENTIFICATION FROM CT IMAGES USING AN INTEGRATED 3D CNN AND TRANSFORMER- BASED FRAMEWORK
676	ICCET262972	USING LARGE LANGUAGE MODELS AND RETRIEVAL-AUGMENTED GENERATION TO BUILD CHAT-BASED KNOWLEDGE BASES FOR TECHNOLOGY ENTERPRISES
677	ICCET263226	A COMBINED ARTIFICIAL INTELLIGENCE SUGGESTION STRUCTURE INCORPORATING YEARS PREDICTION FOR CUSTOMIZED ONLINE SHOPPING
678	ICCET262791	AN INTELLIGENT SYSTEM–BASED MALICIOUS CODE INTRUSION INTENDED FOR DODGING COMPUTERIZED ALGORITHM-BASED MONITORING ASSOCIATED WITH ELECTRONIC HARDWARE EMBEDDED THREATS
679	ICCET262827	AUTONOMOUS RF SIGNATURE AND SENSOR-BASED DRONE DETECTION SYSTEM FOR CIVIL ZONES
680	ICCETPV260578	MULTIMODAL HARASSMENT AND CYBERATTACK DETECTION IN SOCIAL MEDIA USING CONTEXTUAL AI ENGINES
681	ICCETPV260099	SECRASP HIGHPERFORMANCE AND ACCURATE RASP FOR RAPID APPLICATION SECURITY
682	ICCETPV260196	AI-POWERED TOOL FOR AUTOMATED PPT SLIDE GENERATION FROM RESEARCH PAPERS
683	ICCETPV260204	SMART PARKING OPTIMIZATION USING REINFORCEMENT LEARNING
684	ICCET263420	CALM WITH CARNATIC: AN AI-DRIVEN FRAMEWORK FOR MUSIC THERAPY AND STRESS MONITORING
685	ICCET262707	AN AI-POWERED STUDENT SKILL ASSESSMENT, CAREER GUIDANCE, JOB RECOMMENDATION AND STAFF SUPPORT SYSTEM
686	ICCETPV260766	VIMĀNA-BODHA: BRIDGING AERIAL VISION & LANGUAGE FOR REMOTE SENSING VQA
687	ICCET262769	COMPARATIVE ANALYSIS FOR SPECIALIZED LLM FINE-TUNING WITH RAG INTEGRATION
688	ICCET262779	DEEP LEARNING - BASED TOMATO LEAF DISEASE DETECTION
689	ICCETPV260332	GLIMMERGUARD: AN INTELLIGENT AUTOMATIC HEADLIGHT DIMMING SYSTEM USING COMPUTER VISION
690	ICCET262906	QUANTUM HYBRID AI FOR EARLY BRAIN AND LUNG CANCER DETECTION SYSTEM
691	ICCET2622586	SAFEDEDUP: A SECURE FILE STORAGE SYSTEM WITH DEDUPLICATION AND INTEGRITY VALIDATION
692	ICCET261876	EARLY FAULT DETECTION IN LASER POWDER BED FUSION USING PHYSICS-INFORMED ENSEMBLE MACHINE LEARNING MODEL
693	ICCET262842	FINFIT: INTELLIGENT FINANCE MANAGEMENT & FINANCIAL LITERACY SYSTEM FOR STUDENTS AND IRREGULAR EARNERS
694	ICCETPV260017	TRUSTWORTHY MULTI-MODAL DEEP LEARNING FRAMEWORK FOR COMPREHENSIVE LUNG DISEASE DIAGNOSIS AND SEVERITY PREDICTION
695	ICCET262845	AN INTEGRATED QUEUEING AND PREDICTIVE ANALYTICS FRAMEWORK FOR OPD AND BED ALLOCATION OPTIMIZATION IN HEALTHCARE SYSTEMS

696	ICCETPV260176	DESIGN AND FABRICATION OF A GROUND-BASED TEST BED FOR PERFORMANCE EVALUATION OF VTOL UAVS
697	ICCET261400	SMART ENERGY METER WITH CLOUD AND DEVOPS INTEGRATION FOR EFFICIENT ENERGY MANAGEMENT
698	ICCET262688	SMART IOT BASED TUNNEL HAZARD MONITORING AND EARLY ALERT SYSTEM
699	ICCET263187	VIBELY: A HYBRID MERN-AI ARCHITECTURE FOR USER ENGAGEMENT PREDICTION IN SOCIAL MEDIA PLATFORMS
700	ICCETPV260718	CLOUD BASED STUDENT ACCOMMODATION AND MESS SERVICE FINDER
701	ICCET262875	REAL TIME IDENTITY MONITORING FRAMEWORK FOR HIGH-SECURITY ZONES
702	ICCET262746	SMART BORDER SECURITY SURVEILLANCE SYSTEM USING WIRELESS MULTIMETER SENSOR NETWORK
703	ICCET262747	SMART EMBEDDED VISION SYSTEM FOR AUTOMATED PCB DEFECT DETECTION: A DEEP LEARNING APPROACH WITH EDGE AI DEPLOYMENT
704	ICCET263393	DEEP LEARNING FOR WILDLIFE DETECTION AND TRAIN ACCIDENT PREVENTION
705	ICCET263640	EMOTION AWARE RAG - BASED TUTORING SUPPORT SYSTEM
706	ICCET263078	A HYBRID MACHINE LEARNING AND DEEP LEARNING FRAMEWORK FOR DISASTER RISK PREDICTION
707	ICCETPV260459	PRIVACY PRESERVING TECHNIQUES FOR PATIENT MEDICAL RECORDS USING BLOCKCHAIN TECHNOLOGY
708	ICCET263878	ENHANCING USER EXPERIENCE THROUGH ARTIFICIAL INTELLIGENCE-DRIVEN HUMAN-COMPUTER INTERACTION SYSTEMS: AN EMPIRICAL STUDY
709	ICCETPV260778	IOT-ENABLED CROP YIELD PREDICTION AND SOIL NUTRIENT RECOMMENDATION USING MACHINE LEARNING
710	ICCETPV260529	ML-BASED PREDICTION AND OPTIMIZATION OF BATTERY LIFE IN CONSUMER DEVICES
711	ICCETPV260585	AIR QUALITY MAPPING FROM SATELLITE DATA USING MACHINE LEARNING TECHNIQUES
712	ICCET263868	ROBUST SPATIO-TEMPORAL LIP READING USING ATTENTION-ENHANCED EFFICIENTNETB0 AND BI-LSTM ARCHITECTURE
713	ICCETPV260784	DESIGN AND IMPLEMENTATION OF AN IOT-ENABLED REAL-TIME ELECTRICITY THEFT DETECTION AND MONITORING SYSTEM USING ESP32 AND PZEM ENERGY SENSORS
714	ICCET262961	AN RFID BASED SMART EVM SYSTEM FOR REDUCING ELECTORAL FRAUDS
715	ICCETPV260438	AN LLM-BASED FRAMEWORK FOR AUTOMATED INTERPRETATION OF BLOOD TEST REPORTS
716	ICCET263470	STARTUP NAVIGATOR: AN AGENTIC AI ADVISOR FOR GUIDED BUSINESS SETUP
717	ICCET262937	TAMIL NADU RIVER POLLUTION AI MONITORING SYSTEM
718	ICCET263318	SKIN LESION CLASSIFICATION USING IMAGE PROCESSING AND ARTIFICIAL NEURAL NETWORKS
719	ICCETPV260252	TECHNOLOGY – DRIVEN SUSTAINABILITY AND CUSTOMER ADOPTION OF GREEN BANKING PLATFORMS
720	ICCET263942	MACHINE LEARNING-BASED PHYSIOLOGICAL KEY GENERATION FOR SECURE IMAGE ENCRYPTION WITH CNN ENCODING, CHAOTIC DIFFUSION AND AES
721	ICCETPV260325	BONE FRACTURE CLASSIFICATION USING SVM AND MOBILENET
722	ICCET263460	SMART CITY EDGE SECURITY USING RBM-PETRI-GARL IS A FRAMEWORK DESIGNED TO SECURE SMART CITY EDGE DEVICES
723	ICCET260527	AI TOOL FOR MARKETING SMALL MEDIUM ENTERPRISES
724	ICCET263100	STUDENT SECURITY SYSTEM USING RFID AND GPS
725	ICCETPV260335	SMART IOT SYSTEM FOR SAFE TRANSPORTATION OF MEDICAL SUPPLIES

726	ICCET264087	GREEN MARKETING - GREEN ADVERTISING & PROMOTION, GREEN PRODUCT, GREEN PRICING
727	ICCET262991	END-TO-END ENCRYPTED SECURE DOCUMENT VAULT WITH HYBRID CRYPTOGRAPHY AND GRANULAR AUDIT TRAILS: A ZERO-TRUST ARCHITECTURE
728	ICCET263492	REAL-TIME FACIAL RECOGNITION AND UNAUTHORIZED ACCESS ALERT SYSTEM
729	ICCET263738	AN INTELLIGENT MULTIMODAL AI FRAMEWORK FOR REAL-TIME ENVIRONMENTAL UNDERSTANDING AND ASSISTIVE NAVIGATION
730	ICCET264130	EDGEOPT-CNN: A MULTI-TASK LEARNING FRAMEWORK FOR INTELLIGENT COMPUTATION OPTIMIZATION AT EDGE NODES
731	ICCETPV260617	HYBRID CNN – TRANSFORMER MODELS FOR EARLY DETECTION OF CHEMOTHERAPY – RELATED CARDIOTOXICITY IN HEALTHCARE
732	ICCET263079	CAREERHUB-AI: AN END-TO-END INTELLIGENT CAREER NAVIGATION AND MANAGEMENT PLATFORM
733	ICCET263286	SENTIMENT ANALYSIS OF SOCIAL MEDIA POSTS
734	ICCETPV260340	HYBRID ENSMEBLE LEARNING MODEL FOR CORONARY ARTERY DISEASE PREDICTION AND DIAGNOSIS USING LOGISTIC REGRESSION, RANDOM FOREST AND LIGHTGBM
735	ICCET262675	DEVELOPING HYPERGRAPH VISION TRANSFORMERS FOR FINE-GRAINED IMAGE CLASSIFICATION USING DEEP LEARNING APPROACH
736	ICCET261906	PERFORMANCE ANALYSIS OF A RECONFIGURABLE METAMORPHIC SPIRAL ANTENNA FOR MULTI MODE AMPHIBIOUS MILITARY COMMUNICATION SYSTEMS
737	ICCETPV260759	MODULE FOR DETECTING MALICIOUS ACTIVITIES IN CROWDSOURCED ECOSYSTEM APPLICATIONS
738	ICCETPV260261	HYBRID QUANTUM-CLASSICAL MODELS FOR ADMET PREDICTION
739	ICCETPV260468	VOTE CASTING SYSTEM WITH AADHAR VERIFICATION USING BLOCKCHAIN TECHNOLOGY
740	ICCET263455	DEEPTRUST: SEMANTIC-AWARE FAKE REVIEW DETECTION USING HYBRID TRANSFORMER EMBEDDINGS AND ENSEMBLE CLASSIFICATION
741	ICCET263246	AI-POWERED SYSTEM FOR DETECTING GASTROINTESTINAL DISEASES WITH EXPLANABLE INSIGHTS
742	ICCET262954	DEEP LEARNING-BASED FRAMEWORK FOR CALORIE ESTIMATION OF FOOD AND BEVERAGES USING IMAGE ANALYSIS
743	ICCET263057	REAL-TIME MULTIPLAYER COMPETITIVE CODING PLATFORM WITH AI-POWERED LEARNING SUPPORT: A COMPREHENSIVE LITERATURE REVIEW
744	ICCET263269	MEDVISION: A DEEP LEARNING SYSTEM FOR INTERPRETABLE AND CONTINUOUSLY IMPROVING MEDICAL DIAGNOSIS
745	ICCETPV260494	SMART DRONE POTHOLE SURVEILLANCE SYSTEM
746	ICCETPV260657	REAL-TIME SENTIMENT ANALYSIS USING NLP TO ENHANCE USER SERVICE
747	ICCET263361	QUANTUM INTELLIGENCE PLATFORM: A HYBRID QUANTUM-INSPIRED FRAMEWORK FOR INTELLIGENT DECISION PREDICTION AND OPTIMIZATION
748	ICCET263687	SINGLE PHASE INTERLEAVED BOOST CONVERTER BASED ONBOARD EV CHARGER WITH MPC CONTROL
749	ICCETPV260660	NUTRIFUSION: AN INTELLIGENT MULTI-MEDICAL PERSONALIZED NUTRITION RECOMMENDATION SYSTEM
750	ICCETPV260457	SENTRIMARK: NEXT-GEN ATTENDANCE WITH DEEP AUTHENTICATION
751	ICCETPV260584	IOT_INTEGRATED ADAPTIVE EDGE INTELLIGENCE FOR PREDICTIVE DIAGNOSTICS IN SMART INDUSTRIAL ENVIRONMENTS
752	ICCETPV260282	DESCRIPTION OF POWER FRAMEWORK: TYPESCRIPT BUSINESS OBJECTS

753	ICCETPV260272	INTELLIGENT DETECTION OF EXTERNAL VEHICLE DAMAGE USING YOLO FOR AUTOMATED INSPECTION
754	ICCETPV260432	DEEP LEARNING AND MACHINE LEARNING BASED AUTOMATED DETECTION OF VERTEBRAE DISORDERS FROM X-RAY IMAGES
755	ICCET262630	MINDSCOPE – AI-BASED EARLY MENTAL STRESS DETECTION
756	ICCETPV260788	AI BASED MENTAL HEALTH CARE SUPPORT
757	ICCET263795	INFANT CRY CLASSIFICATION USING ENTROPY AND DYNAMIC TIME WARPING FEATURES WITH MACHINE LEARNING AND DEEP LEARNING MODELS
758	ICCETPV260575	A SECURE AND PRIVACY-AWARE CROWD SAFETY SYSTEM FOR EARLY PREVENTION OF STAMPEDE INCIDENTS AT PUBLIC EVENTS
759	ICCETPV260576	A TRANSFORMER-BASED APPROACH FOR REAL-TIME HATE SPEECH AND OFFENSIVE COMMENTS DETECTION
760	ICCET263331	SKINTHESIS - A HYBRID ML BASED PERSONALIZED SKINCARE ANALYSIS AND PRODUCT RECOMMENDATION USING FACIAL IMAGES
761	ICCET263115	SECUREVISION-PRO: A REAL-TIME AI SURVEILLANCE SUITE FOR VIOLENCE, HAZARD, AND SAFETY DETECTION WITH AUDIO-VISUAL INTELLIGENCE
762	ICCETPV260293	HYBRID CLUSTERING – DRIVEN ATTENTION NETWORK FOR ENHANCED TIME SERIES FORECASTING
763	ICCET264041	MULTILINGUAL HOPE SPEECH DETECTION USING TRANSFER LEARNING MODELS
764	ICCETPV260704	REPAIRGO: AI-DRIVEN MULTI-DOMAIN REPAIR COORDINATION WITH INTELLIGENT TECHNICIAN SELECTION AND WORKFLOW AUTOMATION
765	ICCETPV260552	NEXT-GEN AI-DRIVEN MOCK INTERVIEW PLATFORM WITH REALISTIC PRACTICE AND REAL-TIME FEEDBACK
766	ICCETPV260417	CLOUD BASED BABY INCUBATOR CONDITION MONITORING AND ALERT SYSTEM
767	ICCETPV260592	MACHINE LEARNING-BASED COPLANAR MICROSTRIP PATCH ANTENNA DESIGN FOR LUNG CANCER DETECTION
768	ICCET262941	EFFIHMSA-UNET: ADAPTIVE CONVOLUTION WITH STAGE-WISE CHANNEL ATTENTION FOR MULTI-MODAL MEDICAL IMAGE SEGMENTATION
769	ICCET262977	BRIDGEMEND: FROM CONFLICT TO CLARITY
770	ICCETPV260243	DUTY SWAP: A HEALTH-AWARE TASK REALLOCATION SYSTEM FOR HIGH -STRESS JOBS
771	ICCET262975	AGENTIC AI AND AUTOMATION FOR INDUSTRY WORKFLOWS
772	ICCET263430	GENERATIVE ADVERSARIAL NETWORK-BASED REVERSIBLE DATA HIDING FOR SECURE AND ROBUST IMAGE STEGANOGRAPHY
773	ICCET263311	IOT BASED AI POWERED NPK TESTER FOR CROP MANAGEMENT
774	ICCETPV260466	PERFORMANCE ANALYSIS OF SYMMETRICAL CMOS OTA WITH BULK DRIVEN CIRCUIT FOR ECG APPLICATIONS
775	ICCET262999	HYBRID CRYPTOGRAPHIC SCHEMES FOR NEXT-GENERATION CLOUD DATA PROTECTION
776	ICCETPV260463	SKILLMAP-LLM: PERSONALIZED SKILL ROADMAP GENERATOR WITH ADAPTIVE LEARNING & CAREER ALIGNMENT
777	ICCETPV260783	MULTI-MODAL LMS USING AI: VARK STYLE CLASSIFICATION
778	ICCETPV260235	AI-DRIVEN REAL TIME SMART FARMING APPLICATION
779	ICCETPV260271	NEOPHISH: PHISHING URLS DETECTION USING DATA MINING
780	ICCETPV260550	3D OBJECT DETECTION USING LIDAR AND RGB IMAGES
781	ICCET262970	DESIGN AND DEVELOPMENT OF AN AUTOMATED VALIDATION AND DIAGNOSTIC SYSTEM FOR TELECOM BATTERY MANAGEMENT BOARDS

782	ICCET263433	MORPHDETECTIVE: DETECTING MORPHED FACES IN IMAGES AND VIDEOS USING DEEP LEARNING
783	ICCETPV260526	LOW POWER MONTGOMERY ARCHITECTURE BASED ON SEGMENTED CLOCK GATING AND PARTIAL OPERAND ACTIVATION
784	ICCETPV260240	CENTRIFUGAL LAUNCH SYSTEMS- A STUDY
785	ICCETPV260260	LI-FI ENABLED VEHICLE SAFETY AND COMMUNICATION SYSTEM FOR REAL-TIME HAZARD MITIGATION
786	ICCET263074	EARLY WARNING SYSTEM USING LORA FOR LANDSLIDE AND WATER LEVEL DETECTION
787	ICCET263554	SELF-LEARNING AUTONOMOUS CYBER DEFENSE AGENTS FOR AI-EMPOWERED SECURITY OPERATIONS
788	ICCETPV260790	TRAVELVISTA: AN AI ASSISTED SMART TRAVEL PLANNING SYSTEM USING RECOMMENDATION AND ROUTE OPTIMIZATION ALGORITHMS
789	ICCET263080	SECURECHAIN BLOCKCHAIN-DRIVEN PRIVACY SOLUTIONS
790	ICCET263319	SMART BEAM+: AN ADAPTIVE BEAMFORMING APPROACH FOR URBAN IOT COMMUNICATION
791	ICCET263417	IOT BASED WATER QUALITY DATA COLLECTION AND COMPUTING WQI WITH DEEP LEARNING
792	ICCET264093	CAREER RECOMMENDATION SYSTEM WITH SKILL GAP ANALYSIS
793	ICCETPV260548	ATTENTION-ENHANCED SEGFORMER WITH TEMPORAL FUSION FOR AUTOMATED MULTI-CLASS WILDFIRE IMPACT AND RECOVERY MAPPING
794	ICCET264132	REAL-TIME OBJECT DETECTION AND LABELLING FROM CAMERA VIDEO USING DEEP LEARNING
795	ICCET264132A	SMART WEARABLE OBJECT DETECTION AND DISTANCE ALERT SYSTEM FOR THE VISUALLY IMPAIRED USING RASPBERRY PI
796	ICCETPV260169	SHIELD-INTIMACY: A MULTI-STAGE FORENSIC FRAMEWORK FOR PRIVACY-PRESERVING DETECTION OF NON-CONSENSUAL INTIMATE IMAGERY
797	ICCET264145	"TOXIC SHIELD AI" - A REAL TIME TOXIC COMMENT DETECTION AND REWRITING PLATFORM USING AI & ML
798	ICCET263048	INTELLIGENT FIREWALL ANOMALY DETECTION WITH SEMANTIC ANALYSIS AND HYBRID LEARNING
799	ICCET263593	HIGHLY EFFICIENT THREE OPERAND ADDER LEVERAGING WEINBERGER PREFIX ARCHITECTURE FOR SECURITY SYSTEMS
800	ICCET263425	SAFEASSIST+ : AN INTEGRATED ASSISTIVE PLATFORM FOR PHYSICALLY ABLED AND VISUALLY CHALLENGED
801	ICCET263404A	AN AI-DRIVEN MULTI-AGENT FRAMEWORK FOR AUTOMATED REVENUE LEAKAGE DETECTION AND RESOLUTION
802	ICCET264071	SMART TROLLEY WITH AUTOMATIC BILLING SYSTEM
803	ICCET263060	A COMPREHENSIVE REVIEW ON DIRECT SHEAR TEST STUDIES: INFLUENCE OF STANDARD TAMPING LOAD, COMPACTION, AND LAYERING METHOD ON SOIL SHEAR STRENGTH
804	ICCET263212	SMART OUTFIT RECOMMENDATION SYSTEM BASED ON COLOR THEORY USING DEEP LEARNING TECHNIQUES
805	ICCET263721	DETECTION AND ANALYSIS OF VIOLENCE IN VIDEO FOOTAGE USING A 3D CONVOLUTIONAL NEURAL NETWORK
806	ICCET263366	PLANT DISEASE PREDICTION METHODS: FROM TRADITIONAL TO MODERN APPROACHES
807	ICCET263892	DEFENDERPI - AN AI-DRIVEN INLINE NETWORK DEFENSE SYSTEM FOR SMALL AND EDGE NETWORKS USING RASPBERRY PI
808	ICCET263643	ENHANCING AMD DIAGNOSIS WITH TRANSFER LEARNING TECHNIQUES ON FUNDUS IMAGES.
809	ICCET260187	AI ENABLED REMOTE CONTROLLED FIRE FIGHTING ROCKER BOGIE WITH FIRE TYPE DETECTION
810	ICCETPV260642	AI- POWERED SECURE FINANCIAL PORTFOLIO & TRANSACTION PROTECTION PLATFORM WITH BEHAVIORAL BIOMETRICS AND PREDICTIVE FRAUD INTELLIGENCE

811	ICCET263098	BONE AGE ASSESSMENT FROM HAND X-RAYS USING DEEP CNNs AND ATTENTION MECHANISMS
812	ICCET263805	AN IMBALANCE-AWARE DUAL-BRANCH TRANSFORMER ARCHITECTURE FOR IOT INTRUSION DETECTION
813	ICCET263444	A LIGHTWEIGHT DOMAIN-ADAPTIVE FRAMEWORK FOR IMAGE-BASED MALWARE CLASSIFICATION
814	ICCET264427	ANALYSIS OF SMART SOLAR POWERED INDUCTION STOVE WITH FULL BRIDGE INVERTER CIRCUIT
815	ICCETPV260520	ADAPTIVE CREDIT CARD FRAUD DETECTION USING DEEP LEARNING AND REINFORCEMENT LEARNING
816	ICCET262987	INTELLIGENT PATTERN RECOGNITION USING EQUILIBRIUM OPTIMIZER FOR ANDROID MALWARE DETECTION: A HYBRID DEEP LEARNING APPROACH
817	ICCET262988	DECENTRALIZED LOG PROTECTION AND INTRUSION DETECTION USING BLOCKCHAIN-INSPIRED STORAGE: A COMPREHENSIVE ARCHITECTURE FOR CLOUD FORENSICS
818	ICCET263681	GEOSYNTHETIC-REINFORCED SOIL TO ENHANCE FOUNDATION STABILITY
819	ICCET263242	EMBEDDED IMPLEMENTATION OF A DIGITAL TWIN BASED BLDC PROPULSION SYSTEM FOR UAVS
820	ICCET263448	SYMAI- SMART SYMPTOM EVALUATION TOOL
821	ICCET264540	AUTOENCODER-BASED KEY GENERATION FOR SECURE IMAGE ENCRYPTION WITH CHAOTIC DIFFUSION AND AES
822	ICCET263016	REAL-TIME GESTURE-BASED CONTROL OF ELECTRONIC DEVICES USING CNN AND COMPUTER VISION
823	ICCET263426	DISASTER RECOVERY COMMUNICATION PLANNING IN REAL TIME MANET APPLICATION USING A SINGLE ESP32 OFFLINE MESH RELAY
824	ICCET263087	ZENTHRA AI: AN ACTIVE PERCEPTION-BASED AUTONOMOUS AGENT FOR MOBILE TASK AUTOMATION
825	ICCET262978	AI-BASED DELETED DATA RECOVERY FROM STORAGE
826	ICCET264001	DEEP LEARNING BASED IMAGE INPAINTING AND RESTORATION SYSTEM USING PARTIAL CONVOLUTIONAL NETWORKS AND AUTOENCODERS
827	ICCET264439	GOVERNMENT SCHEMES RECOMMENDATION API WITH MULTI-LANGUAGE CHATBOT USING RAG VECTOR SEARCH AND CONVERSATIONAL AI
828	ICCET263009	FRAUD BUSTER: MACHINE LEARNING FOR SAFER TRANSACTIONS
829	ICCET263518	DESIGN OF REAL TIME DIGITAL OSCILLOSCOPE USING STM32 MICROCONTROLLER
830	ICCET263838	AI ENHANCED THERAPEUTIC ASSISTANT FOR LUMBAR HEALTH MONITORING AND SUPPORT
831	ICCET263055	AUTONOMOUS PACKAGE DELIVERY BOT
832	ICCET263144	ANALOG IC DESIGN AND PERFORMANCE ANALYSIS OF SCHMITT TRIGGER USING TWO LOGIC FAMILIES
833	ICCET263305	PERSONALIZED DIET RECOMMENDATION USING GRAPH NEURAL NETWORK AND REINFORCEMENT LEARNING
834	ICCET263304	TRANSFORMER-BASED FOOD IMAGE SEGMENTATION AND CALORIE ESTIMATION FOR INTELLIGENT DIETARY MONITORING
835	ICCET264731	CURV-SAFE : V2X ENABLED LANDSLIDE AND CONFLICT DETECTION
836	ICCET263102	AGRO AID - A DIGITAL FUNDRAISING AND SUPPORT PLATFORMS FOR FARMERS
837	ICCETPV260073	NOVEL ANOMALY-DRIVEN HYBRID DEEP LEARNING FOR IOT TIME-SERIES PREDICTION AND ADAPTIVE SIGNAL ANALYSIS
838	ICCET263377	A GEOSPATIAL MULTI-CRITERIA FRAMEWORK FOR EVALUATING CLIMATE-INDUCED LANDSLIDE SUSCEPTIBILITY
839	ICCETPV260797	CLOUDBURST EARLY WARNING AND ALARM SYSTEM*

840	ICCET263173	IMPLEMENTATION OF INTELLIGENT AGRICULTURAL SUBSIDY RECOMMENDATION APPROACH FOR IDENTIFYING APPROPRIATE FORMERS USING ML TECHNIQUES
841	ICCET263839	IV BAG MONITORING AND ALERT SYSTEM
842	ICCETPV260491	COMPREHENSIVE WEB BROWSER EXTENSION FOR PROACTIVE TESTING AND THREAT MITIGATION: A MULTI-LAYERED CLIENT-SIDE DEFENSE FRAMEWORK
843	ICCET263088	A HYBRID EFFICIENTNETV2B3–VIT DEEP LEARNING MODEL FOR ENHANCED POTATO PLANT DISEASE DETECTION IN PRECISION AGRICULTURE
844	ICCET264031	VITAL AND ENVIRONMENTAL MONITORING USING PORTABLE MEDGUARD SYSTEM
845	ICCETPV260640	DECENTRALIZED AI-POWERED SELF-HEALING ZERO-TRUST DIGITAL IDENTITY & ACCESS MANAGEMENT SYSTEM WITH DEEPFAKE-RESISTANT MULTIMODAL BIOMETRICS AND PREDICTIVE CYBER DEFENSE
846	ICCETPV260744	AI-POWERED WEB APPLICATION FOR EVENT PLANNING AND MANAGEMENT
847	ICCETPV262932	MULTIMODAL EMOTION RECOGNITION FOR MENTAL HEALTH DIAGNOSIS AND RESPONSE SYSTEM USING DEEP LEARNING
848	ICCETPV260511	AUTOMATIC GENERATION OF SEGMENTED EDUCATIONAL VIDEOS FROM TEXT USING NLP AND GENERATIVE AI
849	ICCETPV260502	DETECTING SMART CAR PARKING SLOTS WITH YOLO AND REAL TIME HEAT MAP OF OCCUPANCY
850	ICCETPV260458	IOT AND RSSI BASED DYNAMIC BUS SCHEDULING AND PASSENGER DETECTION
851	ICCET263184	SMART DNS THREAT FOUNDER A MULTI-RESOLVER FRAMEWORK FOR AUTOMATED VULNERABILITY ASSESSMENT AND THREAT SCORING
852	ICCET262938	UNCERTAINTY-AWARE SIGN LANGUAGE RECOGNITION USING SPATIO-TEMPORAL SKELETAL GRAPH LEARNING
853	ICCET264329	AN ML-BASED SLEEP PATTERN ANALYSIS FOR EARLY DETECTION OF MOOD SWINGS AND CARDIOVASCULAR RISK
854	ICCET263847	TWO – STAGE ENERGY EFFICIENT PV – BATTERY LOAD CONSUMPTION BASED ON COST – EFFECTIVE SMART GRID
855	ICCETPV260641	A DECENTRALIZED SMART MULTI-SERVICE BOOKING AND RESERVATION MANAGEMENT SYSTEM USING CLOUD COMPUTING
856	ICCET263007	REAL-TIME POTHOLE DETECTION AND MEASUREMENT USING COMPUTER VISION
857	ICCETPV260427	SUSTAINABLE CONCRETE MANUFACTURING: EVALUATING THE VIABILITY OF ALTERNATIVE WATER SOURCES AND THEIR IMPACT ON DURABILITY
858	ICCETPV260385	PAW SENSE: REAL-TIME PET EMOTIONAL STATE CLASSIFICATION USING DEEP LEARNING AND WEBCAM-BASED VISUAL CUES
859	ICCETPV260665	SPECTRUM SENSING FRAMEWORK FOR WIRELESS INFORMATION TRANSMISSION BY DEEP CNN–BIGRU–BIRNN FOR COGNITIVE RADIO SENSOR NETWORKS
860	ICCET264030	FINITE EARTH: A WEB3 MULTIPLAYER STRATEGY GAME FOR SUSTAINABLE RESOURCE MANAGEMENT
861	ICCETPV260643	EDUGEN-AI: CONCEPT CENTERED ADAPTIVE LEARNING SYSTEM FOR ACADEMIC MASTERY
862	ICCET263046	AI-BASED AUTOMATIC ARTWORK GENERATION FROM SOURCE CODE STRUCTURE
863	ICCET262200	NEXAI: AN EXECUTION-DRIVEN APPROACH TO AI-BASED RESOURCE MANAGEMENT AND INTELLIGENT CONTROL
864	ICCET263857	LEVERAGING GENERATIVE AI TO IDENTIFY AND REDUCE MEDIA BIAS
865	ICCET263891	DESIGN AND ANALYSIS OF NATURE-INSPIRED PETAL AND LEAF SHAPED MULTIBAND WEARABLE ANTENNAS FOR BIOMEDICAL APPLICATIONS
866	ICCETPV260589	AUTOMATED LUNG AND COLON CANCER DETECTION USING HYBRID ATTENTION GUIDED CNN

867	ICCET263816	DESIGN OF BROADSIDE MICROSTRIP PATCH ANTENNA WITH EBG STRUCTURE TO INCREASE GAIN
868	ICCET264040	AUTOMATED PRACTICE INTERVIEW: A NEW EPOCH IN ASPIRANT DEVELOPMENT
869	ICCET263771	AI-POWERED HEALTHCARE CHAT PLATFORM FOR PATIENT ENGAGEMENT & APPOINTMENTS
870	ICCET263632	INTELLIGENT PATIENT HEALTH RECORD MANAGEMENT AND EARLY DIAGNOSIS AI SYSTEM
871	ICCETPV260779	DEEP LEARNING BASED EARLY DETECTION AND PROGNOSIS OF RHEUMATOID ARTHRITIS
872	ICCETPV260334	INTELLIGENT OF PERSONAL DIGITAL ASSETS: AN AUTOMATED FRAMEWORK FOR LIFECYCLE COMPLIANCE
873	ICCET263290	AUTOMATED BRAIN LESION DETECTION AND QUANTIFICATION USING DEEP BELIEF NETWORKS WITH REINFORCEMENT LEARNING-ENHANCED SEGMENTATION
874	ICCET263285	SMART SHIELDS: HYBRID ML AND NLP APPROACH FOR DETECTING EMAIL PHISHING
875	ICCET264479	A STUDY ON THE IMPACT OF EMOTIONAL INTELLIGENCE ON JOB PERFORMANCE AMONG INFORMATION TECHNOLOGY PROFESSIONALS
876	ICCET263137	AI-VISION BASED SURGICAL INSTRUMENT CLASSIFICATION AND LOCALIZATION
877	ICCET263340	AN EASYOCR BASED MOBILE APPLICATION FOR BUSINESS CARD DIGITIZATION AND MANAGEMENT
878	ICCET263190	CONTENT BASED LEGAL RECOMMENDATION TOOL
879	ICCET263196	PREDICTIVE DEVOPS - FORECASTING BUILD AND DEPLOYMENT FAILURES
880	ICCET264375	BLINKCRYPT :AES - SECURED MORSE COMMUNICATION WITH SOS TRIGGER SYSTEM
881	ICCET263631	COMPARATIVE ANALYSIS OF MACHINE LEARNING AND DEEP LEARNING APPROACHES FOR MRI-BASED BRAIN TUMOR DETECTION
882	ICCET263038	REAL-TIME ANIMAL DETECTION ON RAILWAY TRACKS USING YOLO
883	ICCET262891	GEOSPATIAL QUERYING SYSTEM
884	ICCET263811	VEHICLE TO GRID AND GRID TO VEHICLE IN MICROGRID
885	ICCET263865	ECG-BASED CLASSIFICATION OF TYPES OF DEPRESSIVE DISORDER USING CONVOLUTIONAL NEURAL NETWORKS: A DEEP LEARNING STUDY
886	ICCET262964	EXPLAINABLE MULTIMODAL ANEMIA PREDICTION USING DEEP LEARNING ON VISUAL SYMPTOM INPUTS
887	ICCET262979	AI-BASED ADAPTIVE ONTOLOGY FRAMEWORK FOR AUTONOMOUS EXTRACTION AND PURCHASE ORDER PROCESSING FROM UNSTRUCTURED EMAILS
888	ICCET263221	NEUROLOGICAL DISORDER CLASSIFICATION
889	ICCET263163	A UNIFIED INTERACTIVE FRAMEWORK FOR METRIC-AWARE COUNTERFACTUAL SENSITIVITY ANALYSIS AND BIAS – RESPONSIVE OPTIMIZATION IN MODEL – AGNOSTIC MACHINE LEARNING SYSTEMS
890	ICCET263150	STOCK MARKET PREDICTOR USING AI
891	ICCET264697	COMPUTATIONAL INTELLIGENCE APPROACHES FOR METAPHOR DETECTION IN LOW-RESOURCE LANGUAGES: A SYSTEMATIC SURVEY WITH FOCUS ON MALAYALAM
892	ICCET263984	LUNG CANCER CLASSIFICATION USING CT SCAN IMAGES AND U-NET BASED DEEP SEGMENTATION FRAMEWORK
893	ICCET263820	THE ALGORITHMIC COMPASS: NAVIGATING THE INTERSECTION OF AI-DRIVEN CSR AND PREDICTIVE MARKETING IN THE AGE OF SUSTAINABILITY
894	ICCET263822	AUTHENTICITY IN THE AGE OF SIMULATION: EVALUATING THE VALIDITY AND ETHICS OF AI-GENERATED "SYNTHETIC CONSUMERS" IN MARKET RESEARCH

895	ICCET263330	AUTOHIRE: AN AGENTIC AI-BASED INTELLIGENT JOB ASSISTANT FOR RESUME-DRIVEN JOB MATCHING AND INTERVIEW PREPARATION
896	ICCET263262	ANTI-JAMMING MECHANISM FOR HIGH-VALUE TRANSPORTATION SYSTEMS
897	ICCET263259	SMART CHEQUE VERIFICATION SYSTEM
898	ICCET263278	A MULTI-STAGE SAFETY-ALIGNED LEGAL ADVISORY FRAMEWORK USING HYBRID NLP AND RULE-BASED REASONING
899	ICCET263244	DRIVE - DATA RECORDER AND INTELLIGENT VEHICLE EVALUATOR
900	ICCET262981	MEDILOCK: BLOCKCHAIN SMART CONTRACT SOLUTION FOR HEALTHCARE PRIVACY

500.A VERIFIED CROWDSOURCED FUEL AVAILABILITY AND COMPATIBILITY MAPPING SYSTEM FOR INDIAN VEHICLES

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India's gradual transition toward high ethanol blended petrol (E20) is a critical step toward energy sustainability. However, a large fraction of the existing vehicle fleet remains incompatible with E20 fuel and vehicle owners often lack reliable, vehicle-specific information regarding fuel suitability. The existing fuel locators or navigation platforms primarily focus on the location and pricing details without addressing fuel compatibility or verifying the correctness of data reported by the users. This paper presents a verified crowdsourced fuel availability and compatibility mapping system designed for Indian vehicles. The system autonomously verifies crowdsourced fuel information with a Data Verification Engine (DVE) that improves the reliability of user contributed data using trust scoring, temporal validation, location validation and consensus mechanisms. Unlike conventional crowdsourcing approaches, the system emphasizes vehicle-centric decision support, enabling users to identify fuel stations offering compatible petrol for their vehicles.

501.FCM AND DEEP LEARNING BASED BREAST CANCER SEGMENTATION & CLASSIFICATION

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Breast cancer has grown into a leading cause of mortality worldwide. In this proposed system, we have created an interactive platform where an administrator can control all the features, such as uploading the data set and instructing the models, from a dashboard that is easy to use. In our proposed system, the administrator logs in and starts the workflow by using the Load Data option to upload the whole dataset. We are putting the following algorithms into the system: Gradient Boosting and Capsule Networks. Gradient Boosting uses a series of ineffective learners to learn patterns in the extracted features. These weak learners will eventually come together to form a robust predictive model. On the other hand, These capsule Networks keep the spatial orientation and part-whole dependencies in mammogram images, which helps them find hierarchical relationships. The results

indicate that CNN, in conjunction with Capsule Net, enhanced the efficacy of recognizing and categorizing breast cancer with maximal precision.

502. SINGLE-IMAGE REAL-TIME FACIAL REENACTMENT USING FOMM AND GANS

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A deep learning-based framework is proposed to generate realistic facial animations without relying on traditional 3D modeling pipelines or computationally expensive rendering techniques. Unlike conventional approaches that require explicit 3D mesh construction, multi-view capture systems, or complex rigging procedures, this method operates directly on 2D inputs. The system requires only a single still photograph of a person (referred to as the source image) and a separate driving video that contains the motion and expressions to be transferred. The driving video acts as a dynamic motion template, providing temporal information such as head rotation, facial muscle movement, and expression changes. By extracting motion patterns from the driving sequence and mapping them onto the static source image, the system is able to synthesize a lifelike animated representation without needing any explicit 3D facial scan data. The core principle behind this approach is motion disentanglement and transfer. The driving video contains rich motion cues that can be tracked frame by frame using dense keypoint detection. These motion signals are separated from identity features, ensuring that only expression and pose dynamics are transferred while the structural identity of the source image remains unchanged. The model learns spatial correspondences between the driving face and the static image, allowing it to deform the source image in a geometrically consistent manner. Even though the system operates primarily in

2D space, it estimates implicit 3D structural information by modeling depth-aware transformations learned during training. To achieve high-fidelity animation, the system detects and processes approximately 300 facial landmarks distributed across different facial regions. These landmarks are categorized into three major regions: (1) eyes and eyebrows, which are critical for emotional expressiveness; (2) mouth, nose, jawline, and chin, which capture articulation and speech-related motion; and (3) finer geometric details across the cheeks, forehead, and other facial areas that contribute to subtle expression variations. For each landmark, the model extracts two-dimensional spatial coordinates from both the source image and the driving frame. Using these spatial correspondences, it estimates relative transformations and approximates their corresponding 3D positional relationships. The integration of these landmark movements produces a dense motion field that encodes both global head movement (such as rotation, translation, and scaling) and localized muscle deformations. By combining motion estimation with generative synthesis, the system reconstructs a coherent and natural-looking animated face. The predicted landmark transformations are applied through learned warping functions that deform the static image while preserving identity-specific features such as facial proportions and texture details. This ensures that the resulting animation appears smooth, structurally consistent, and visually realistic. Overall, the approach demonstrates that high-quality facial animation can be achieved from minimal input data using learned motion representations, eliminating the need for explicit 3D reconstruction while still approximating realistic facial geometry and expression dynamics.

503.DESIGN AND DEVELOPMENT OF AN AI-INTEGRATED AUTONOMOUS ROVER FOR SUSTAINABLE BEACH CLEANING

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This paper describes the creation of an AI-integrated autonomous beach cleaning rover that uses sustainable and automated waste collection to tackle the increasing issue of coastal pollution. The rover's solar-powered energy architecture and Raspberry Pi-based control system allow it to run continuously and sustainably. It uses depth sensors, GPS, ultrasonic sensors, and a load cell to measure collected waste, detect obstacles, identify debris, and navigate sandy terrain. The system can separate waste into metal and non-metal categories using an onboard AI classification model, which decreases human labor and increases sorting precision. Real-time robot status monitoring and waste data collection are supported by an IoT interface. The suggested system increases the effectiveness of beach management and shows great promise for scalable implementation in coastal environments.

504.DEVELOPMENT OF A SYSTEM FOR AUTOMATED DIAGNOSIS OF SKIN DISEASES USING DEEP LEARNING

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Skin diseases such as eczema, psoriasis, tinea (ringworm), and acne are highly prevalent and often require early detection to prevent complications. However, manual diagnosis can be subjective and time-consuming, particularly in regions with limited access to dermatologists. This project aims to develop an automated skin disease classification system using deep learning models to support faster and more consistent diagnosis.

Multiple architectures, including EfficientNet-B3, MobileNetV2, DenseNet121, and Swin Transformer, were trained, evaluated, and compared through extensive hyperparameter experimentation. Among these, the Vision Transformer (ViT-B/16), pretrained on ImageNet-21k and fine-tuned for four disease categories, achieved the highest accuracy. The model processes images by converting them into 16×16 patches, embedding them into token sequences, and learning spatial relationships through transformer encoders. Training was performed in two phases: First, training the classification head with a frozen backbone, followed by full fine-tuning using cosine-annealing learning rate scheduling. The dataset was standardised through preprocessing, normalisation, and robust augmentation strategies to improve model generalisation across diverse skin textures, lighting conditions, and image variations. Evaluation metrics, including accuracy, precision, recall, F1-score and Confusion matrix, demonstrated that the ViT-B/16 model provided the most reliable diagnostic performance. The final trained model has been saved and integrated into a web-based diagnostic application for practical use. This work highlights the effectiveness of transformer-based architectures in medical image classification and provides a scalable AI-assisted diagnostic tool. Future improvements include expanding the dataset, enhancing accuracy further, and preparing the work for research publication.

505.A HIGH-ACCURACY CORONARY HEART DISEASE PREDICTION SYSTEM USING IMPROVED LIGHTGBM AND HYBRID VOTING CLASSIFIER

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Early and reliable CHF diagnosis is possible and coronary heart disease reduces mortality and medical costs. This work presents an extended hybrid prediction framework that integrates an OPTUNA-optimized LightGBM model with a Voting Classifier composed of Random Forest and AdaBoost to enhance diagnostic accuracy. The ensemble-based extension improves generalization by combining the strengths of multiple learners, achieving an accuracy of 99%, which demonstrates strong robustness in distinguishing disease patterns. Flask is used to construct a user-friendly web app with SQLite database connection for real-world use. This makes model testing user signup and signin safe. The proposed extension not only addresses class imbalance and performance

limitations of individual models but also delivers a practical and deployable solution for intelligent cardiovascular disease prediction. Experimental data shows that the hybrid ensemble method outperforms independent models, making it suitable for reliable clinical decision support systems.

506. QUIZIFY AI: SMART VIDEO SUMMARIZER AND QUIZ GENERATOR USING TRANSFORMER-BASED NLP

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The rapid growth of digital learning platforms, educational videos have become a major source of knowledge for students. However, learners often face difficulty in quickly understanding and revising the main concepts from lengthy video content. To solve this problem, the proposed system, Quizify AI, is designed to automatically generate concise summaries and interactive quizzes from educational YouTube videos. By providing the URL of an educational video, the system extracts the relevant information, processes the content using advanced Natural Language Processing (NLP) techniques, and produces a meaningful text summary of the video. In addition, Quizify AI generates multiple-choice and short-answer questions based on the extracted key concepts, enabling users to test their understanding instantly. An automatic scoring mechanism is also integrated to evaluate users' performance in real time. This system helps students improve comprehension, supports effective revision, and saves time by eliminating the need to watch full-length videos repeatedly. Quizify AI enhances learner engagement, supports self-assessment, and contributes to the advancement of smart and personalized e-learning systems.

507. DESIGN OF BI-DIRECTIONAL CONVERTER FOR AI DRIVEN HYBRID RENEWABLE SYSTEM

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This study presents the design and implementation of a bidirectional DC–DC converter aimed at efficient energy management in a hybrid power system. The system integrates solar energy, AC supply, and a battery storage unit to ensure an uninterrupted power supply to various loads. Under sunny conditions, the solar panel provides energy directly to the loads while simultaneously charging the battery. In the absence of sunlight, the AC source powers the loads, and the battery remains charged through solar input. During power outages or cloudy conditions, the stored energy in the battery is discharged via the bidirectional converter to supply the connected loads. The converter functions in two distinct modes: the charging mode, which stores excess solar energy in the battery, and the discharging mode, which delivers stored energy to the loads. The proposed bidirectional converter design offers advantages such as compactness, low cost, and adaptability for small-scale renewable

applications like home backup systems and electric vehicle (EV) charging. By integrating intelligent source selection and renewable energy utilization, the system achieves improved power quality and operational efficiency. Simulation and prototype analysis carried out in MATLAB/SIMULINK validate the performance of the proposed design, demonstrating enhanced energy utilization, better flexibility, and reliable power delivery compared to conventional hybrid systems.

508.DEVOPS PIPELINE FOR LEGACY SYSTEM MODERNIZATION

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The legacy systems developed using old infrastructure have been criticized for the lack of flexibility, cost of maintenance, and risks associated with the operation of the system, thus making modernization a critical requirement for the organization. DevOps pipelines can be used to address these issues by providing flexibility and well-structured environments, along with the ability to build systems over time rather than developing them. Organizations can use CI/CD pipelines to address technical debt and risks associated with the operation. There are different approaches to modernization that are analyzed using real-life examples from different industries to identify the most successful approaches, develop success factors, and develop a feasible model for organizations involved in the modernization process of legacy systems. The results show that organizations using staged migration methods and automated testing are able to achieve faster release cycles and lower deployment failure rates than the traditional method. The overall approach led by DevOps provides a feasible, reliable, and scalable solution to the modernization of legacy systems. The approach is stable while continuing to add value to the business.

509.BRAIN TUMOR DETECTION USING DEEP LEARNING TECHNIQUES

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Magnetic Resonance Imaging (MRI) is an important tool in the diagnosis of brain tumors in the contemporary neurological care. Early diagnosis shows a definite increase in the treatment planning process, survival, and the overall patient outcomes. Nevertheless, manual analysis of MRI scans is time-consuming and requires a lot of radiological experience. The difference in the sizes, shape, the texture of the tumors and the intensity distribution also adds to the complexity of the correct diagnosis. To overcome these issues, this paper introduces a deep learning-based model of the automated brain tumor detection and classification.

The method that has been proposed is a combination of systematic MRI preprocessing methods and a Convolutional Neural Network (CNN) architecture that is aimed at extracting discriminative spatial features out of the medical images. Image preprocessing pipeline involves image normalization, image resizing and augmentation to improve the generalization of the image score and minimize the tendency of the model to overfit. The neural network is conditioned to differentiate tumor and non-tumor cases and the sensitivity of the neural network to small abnormalities of the structure. Clinically relevant measures are used to evaluate performance including accuracy, precision, recall and F1-score to guarantee diagnostic reliability.

Comparable research proves that deep learning models are superior to traditional machine learning methods that use handcrafted features. The implementation approach proposed focuses on strength, scalability and pragmatical implementations concerns on actual healthcare set-ups. The system will help in enhancing efficiency of medical imaging processes by saving time, which radiologists use to diagnose, and automated decision support, which provides assistance to the radiologists.

The results show that deep learning approaches represent a consistent and scalable method to detect brain tumors using MRI images. The multi-modal MRI fusion, segmentation-based localization and explainable AI mechanisms can be included in future improvements to enhance further interpretability and clinical adoption.

510.INDUSTRIAL ENERGY MONITORING SYSTEM USING IOT AND RS-485 DIFFERENTIAL COMMUNICATION

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To enhance operational efficiency, safety, and maintenance planning, industrial facilities need to have quality and noise-free electrical parameter monitoring. Traditional monitoring systems have a problem of signal degradation, electromagnetic interference, and remote inaccessibility. The paper describes an Industrial IoT Energy Monitoring System that will use the RS-485 communication standard and Modbus RTU protocol to provide a reliable long-distance data acquisition of the PZEM-004T energy meter. The master node (ESP32 microcontroller) collects and processes the collected measurements and transmits real-time telemetry safely to users via the Telegram Bot API with the help of HTTPS. The system offers real-time voltage, current, power, energy, frequency and power factor monitoring and includes threshold based alerts by way of a local LED indicator and instant Telegram alerts. The solution proposed shows a low cost, scalable, and reliable architecture that can be used in an industrial environment that requires real-time electrical energy monitoring and fault detection.

511.A CONTROLLED COMPARATIVE STUDY OF TRANSFORMER-BASED ARCHITECTURES FOR INSTRUCTION SIMPLIFICATION IN SAFETY-CRITICAL TEXT

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Instruction simplification plays an important role in making safety-critical information easier to understand and use. This is especially true in areas such as healthcare and technical documentation, where unclear or misunderstood instructions can lead to serious consequences. In this paper, we present A transformer-based comparative study with proper control language models for automatic simplification of instructions, By contrasting decoder-only and encoder-decoder architectures. We evaluate GPT-2 as a representative a prompt-based causal language model that uses only a decoder. State-of-the-art modeling approach, and T5-small as an encoder-decoder model. Fine-tuned in a sequence-to-sequence setting. The experiments are carried out on a curated dataset of complex instructions paired with their simplified versions, with experimental controls in place to reduce confounding effects. Model performance is measured using BLEU, ROUGE-L, and SARI. Under these controlled conditions, T5-small achieves a ROUGE-L score of approximately 0.32, a BLEU score close to 0.0, and a SARI score of about 37.8. These results indicate that the model is able to perform moderate simplification while only partially preserving the original meaning. A detailed error and safety analysis reveals common issues such as unnecessary repetition and slight semantic drift, highlighting the risks and limitations of

relying solely on automated methods in safety-critical scenarios. Overall, the findings suggest that encoder-decoder transformer architectures are better suited than decoder-only models for instruction simplification, particularly when the task is evaluated under controlled experimental settings and where correctness and clarity are essential..

512.COMPARATIVE ANALYSIS OF KALMAN FILTER–BASED STATE ESTIMATION TECHNIQUES FOR HEALTH MONITORING OF A 4S1P LITHIUM-ION BATTERY PACK

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Accurate estimation of battery state parameters is critical for ensuring safe operation, reliability, and optimal energy utilization in lithium-ion battery packs used in electric vehicles and energy storage systems. Due to nonlinear battery characteristics, aging effects, and measurement noise, conventional estimation techniques often fail to provide reliable results under dynamic operating conditions. This paper presents a comparative analysis of Kalman filter–based state estimation techniques for health monitoring of a 4S1P lithium-ion battery pack using a MATLAB/Simulink-based Battery Management System model. The real state of charge (SOC) is obtained using the Coulomb counting method, while estimated SOC is computed using four filtering approaches: Extended Kalman Filter (EKF), Extended Kalman–Bucy Filter (EKBF), Unscented Kalman Filter (UKF), and Unscented Kalman–Bucy Filter (UKBF). State of health (SOH) and internal resistance variations are analyzed to assess battery degradation over time. The performance of each filter is evaluated in terms of estimation accuracy, convergence speed, stability, and robustness under dynamic load conditions. Simulation results demonstrate that EKF and EKBF suffer from linearization limitations, whereas UKF provides improved accuracy by effectively capturing nonlinear battery dynamics. The UKBF achieves the best overall performance, offering faster convergence, higher estimation accuracy, and enhanced stability, making it the most suitable estimator for health monitoring of a 4S1P lithium-ion battery pack in practical BMS applications.

513.TRANSITPAY: A SMART BUS FARE SOLUTION USING IOT”

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Public transportation plays a critical role in urban mobility; however, traditional bus fare collection systems still rely heavily on manual processes involving conductors, paper tickets, and cash handling. These approaches often result in long boarding times, calculation errors, revenue leakage, and lack of transparency. To address these limitations, this paper presents TransitPay, an IoT-based smart bus fare collection system that automates passenger identification, fare computation, and digital payment processing. The proposed system integrates RFID technology, facial recognition, GPS tracking, and cloud computing to enable accurate and contactless fare collection. Passengers are authenticated using RFID cards or facial recognition at boarding and exit points. Travel distance is calculated using real-time GPS coordinates and the Haversine algorithm, ensuring fair distance-based fare computation. The fare amount is deducted automatically from the passenger's e-wallet, with QR-based payment as a fallback option. All transaction data is securely stored in the cloud for real-time monitoring and analytics. Experimental results demonstrate reliable fare calculation, reduced boarding time, and efficient cloud synchronization. The TransitPay system enhances operational efficiency, supports cashless transactions, and contributes to smart city transportation initiatives by providing a transparent and scalable fare management solution.

514.DEVELOPMENT OF A MOBILE APPLICATION TO PROVIDE RECREATIONAL SUITABILITY INFORMATION OF BEACH LOCATIONS ACROSS INDIA

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India's enormous coastline provides a wide range of beaches with different environments that vary in their safety, cleanliness, level of crowding and climate as well as available amenities. While local and international visitors want to use the beach for recreation, they typically do not have a reliable or standard method of determining if their chosen beach is appropriate for use at a specific time. This study will propose a mobile application that provides real-time information on whether individual beaches throughout India are suitable for recreational activities. The proposed system will collect many different sources of information including but not

limited to: weather, sea state, pollution index, number of visitors to the beach, and user reviews. A model for assessing the suitability of beaches will be developed using weighted decision criteria in order to classify beaches into three different categories: highly suitable; moderately suitable; not suitable. The mobile application will integrate GIS Mapping, GPS, and predictive data analytics in order to provide users with organized recommendations related to the suitability of their beach selection. The proposed system will also provide user access to emergency alerts, safety procedures, and facility information (e.g., lifeguard availability; availability of restrooms; access to transportation). A feedback module will enable users to provide real-time observations that will help to refine the model's predictive validity over time. The expected outcome is a smart tourism support tool that enhances visitor safety, promotes sustainable coastal tourism, and assists authorities in beach management. The application will help users make informed decisions, reduce risk during hazardous conditions, and improve overall recreational experience at Indian beaches.

515.A REAL-TIME ACCIDENT DETECTION AND ALERT SYSTEM USING DEEP LEARNING AND COMPUTER VISION

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Road accidents remain among the leading causes of fatalities worldwide, primarily due to delayed detection and slow emergency response. This paper proposes a real-time accident detection and alert system combining deep learning and computer vision to enhance traffic safety and response efficiency. The proposed approach employs a convolutional neural network that has been trained on the Accident Detection from CCTV Footage dataset [9] to automatically identify accident events from CCTV images extracted from live surveillance feeds. Upon detection, the system triggers automated alerts through SMS, email, and audio notifications to ensure immediate awareness and faster emergency intervention. The system was evaluated on a publicly available CCTV accident dataset consisting of 967 images. Experimental results demonstrate reliable performance with balanced accuracy, precision, and recall under diverse lighting and traffic conditions. The proposed approach's low computational cost and scalability make it suitable for practical deployment in smart city surveillance and intelligent transportation systems, potentially reducing response time and saving lives. Experimental results show that the proposed system achieves an overall accuracy of 85% while maintaining real-time performance.

516.VOICE-DRIVEN HEALTHCARE CHATBOT FOR RURAL PATIENTS

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The growing trend in digital health care has brought attention to the role of intelligent systems capable of providing immediate assistance in the medical field. The problem in existing symptom analysis systems is the text user interface, which lacks effectiveness in elderly users, visually impaired persons and emergency situations. To address this problem, the development and implementation of a medical chatbot based on the voice user interface has been presented in this effort. The chatbot allows users to articulate in natural language to get a speedy medical checkup. The chatbot combines speech recognition tasks, symptom recognition and a rule dependent disease prediction model. The model incorporates structured medical knowledge about the symptom categories, severity levels, medications and precautions. The user query passes through the speech recognition process, symptom matching, and weighted severity analysis tasks in the chatbot. The chatbot provides verbal output regarding the possible diseases, precautions and medical advice. The simulation results have established the reduction in symptom analysis times, improved accessibility and correct symptom analysis in the chatbot. The results indicate the improved user engagement because of the voice interaction component, while maintaining accurate medical analysis. This chatbot prototype contributes to developing medical assistance as the first point of contact in resource limited environments. For the future, the plan includes the incorporation of machine learning algorithms to develop the disease prediction component, support multiple languages and instant connectivity to the medical health systems.

517.REAL-TIME TICKET BOOKING SYSTEM

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Real-time ticket booking systems that allow a user to book an event, movie or show online in real time are one of the most sought after web technology applications of the modern world. These systems help in saving manpower, eradicate any errors in the booking system and provide the user with convenience, through dynamic access to both event information and live seats availability. With the growth of digital event to create and run online platforms are gaining momentum among its management, users and organizers and this is why it has decided to safely and in real time to have seat reservation. However, real-time synchronization introduces challenges such as concurrency in seat selection, double-booking risks, and unauthorized access. All these

problems indicate that a successful and interactive system must be developed that will help update the data and access controls to make sure that no user will be able to overwrite another user or interfere with the actions of his or her data user to reserve the rooms. Moreover, user event creation requires secure event creation and event control to be in place so that no one can interfere and manipulate booking information. In order to address the challenges presented below, the online ticket booking system is presented in this system, which is implemented with the MERN stack - MongoDB, Express.js, React.js and Node.js and Socket.IO as a two-way and event-based communication between the client and the server. JWT-based system also authorisation to allow the secure user access and executes role-based authorisation to differentiate between regular user and event managers. The proposed solution will provide a scaled, user-friendly and secure system to event organizers and attendees alike, ensuring the safety of the data, responding promptly in real time and efficiently managing tickets in a distributed environment..

518.AUTOMATED SKIN DISEASE CLASSIFICATION USING DEEP LEARNING ENSEMBLE MODELS

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–In this paper we identified and predict most dangerous skin diseases like Chickenpox, Measles, Monkeypox. Identifying skin disease is too lengthy process. Because the affected person should go to hospital and give the samples and waiting for the results. This should be taking too long process. In this paper we developed a system that detects the skin disease immediately and provides the nearest hospital location and immediate healthcare and precautions everything it is providing. Sometimes in rural and urban areas the doctors are not available all the time. This system identifies the disease and provides healthcare tips to the patient. For this we used multiple deep learning models such as Custom CNN, MobileNetV2, EfficientNetB0, and VGG16. In those algorithms I got highest accuracy for MobileNetV2 with 92% and after that I applied multiple ensemble methods such as like Bagging, Boosting, Stacking, and Weighted Voting. In these ensemble models we combined all the models in each ensemble model and got the better result. In those ensemble models we got highest accuracy for Stacking and Bagging with 94.70% and remaining models got same as 94.45%. we also created a web app. It is user friendly and the person should predict the skin disease in their mobile device immediately by using credentials which are provided by the admin.

519.AI VOICE RECRUITER AGENT: AN AI-POWERED VOICE-INTERACTIVE RECRUITMENT SYSTEM WITH FRAUD PREVENTION

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With rising volumes of job applicants worldwide and increasing adoption of remote interview formats, traditional recruitment processes face challenges related to fairness, efficiency, and integrity. This paper introduces

the AI Voice Recruiter Agent, an AI-powered, full-stack web system that transforms early-stage candidate interviewing through voice-based interaction, AI-driven question generation, real-time evaluation, and automated fraud prevention. Leveraging Next.js, ReactJS, Supabase, and the Vapi AI voice API, the platform combines recruiter-oriented scheduling dashboards with sophisticated candidate examiners. Features such as mobile device detection and video verification safeguard remote interview authenticity. Evaluation results demonstrate the system's ability to reduce recruiting workload, minimize human biases, and increase candidate screening reliability.

520.DEVELOPMENT OF AN AFFORDABLE INTERNET OF THINGS-BASED BOWEL SOUND MONITORING SYSTEM FOR ANALYSING GUT HEALTH

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Traditional approaches are frequently intrusive or subjective, making the objective evaluation of gastrointestinal (GI) health a major clinical challenge. In this work, a low-cost, non-invasive Internet of Things (IoT)-based system for the real-time monitoring of bowel sound frequencies is developed and validated. The system uses an Arduino-based microcontroller to condition and process the abdominal acoustic signals that are recorded by a high-sensitivity Knowles condenser microphone. Twenty male subjects (ages 18 to 24) with a range of Body Mass Index (BMI) classifications were used to gather data on various meal types (solid, semi-solid, and liquid) and timings. Significant pre-meal frequency peaks that indicate the cephalic phase of digestion and a distinctive post-meal "dip-and-rise" pattern that reflects acoustic muffling followed by the reflex of gastrocolic. Especially in subjects who were overweight, solid meals produced greater frequency spikes than liquid meals. Significant inter-individual variability was noted, indicating the presence of distinct acoustic signatures; however, these patterns were found to be modulated by BMI. The results indicate that an individual's acoustic signature may be a useful biomarker for digestive function and show the system's potential as an approachable tool for individualized, long-term gut health monitoring.

521.APPLICATIONS OF MULTI-TEMPORAL AERIAL IMAGE EVALUATION FOR THE TRACKING INSIDE THE LANDSCAPE

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Within the last seventy years aerial pics have represented a critical supply of statistics on land cover on a detailed scale. The paper deals with the use of aerial images within the study of landscape modifications produced by way of deep coal mining. The authors display the opportunities of multi-temporal land cowl evaluation within the mining district. Analysing a series of aerial snap shots overlaying the period from the second one 1/2 of the 20th century to the beginning of the twenty first century. The paper highlights now not simplest the precise, functions of deep coal mining presentations on aerial pictures, but it additionally points to the necessity of understanding the essential strategies which are related to the land cover adjustments. On the base of the multi-temporal analysis the authors described seven basic strategies that reflect the traits in the panorama modifications within the area of study. Objectives: Research on land use has increased in intensity since the 1990s.Due to the topic's importance and the significant contribution of geo information technologies that made it easier to use new working and interpreting techniques. The study concentrated on long-term modifications to the landscape's macrostructure in the Czech Republic [Bik et al., 1996, 1997, and 2002. Methods: Regarding the speed at which land cover is assessed using historical aerial photographs, the inability to apply automatic classification methods is another additional restriction. Its foundations lie in the spectral

behaviour of the inability to apply automatic classification methods is another additional restriction, which take into account an object's spectral behaviour. Taking archival features into account In aerial photographs, the pixel value need not correspond to a distinctive spectral feature, of a thing. Additionally, the spectral behaviour of many land cover types is comparable. Categories prevent the inclusion of a part and prevent obvious identification, at a fine-grained mapping scale, of photos into specified land cover categories. Though, in correct analysis must be done in order to assess changes to the landscape associated to mining, kinds of land Results: The methodology of a BIOPRESS provides the foundation for the description of these procedures. international undertakings and working with the results of the so far published peer studies and an international project the CORINE Land Cover databases have been evaluated [Feranec and Oahe, 2001; Biopress,2008]. As a result, these procedures largely evaluate changes in quantity between several types of land cover. Conclusions: Historical aerial photographs are a more practical information source than satellite images for the study of long-term and spatially distributed changes in the terrain caused by deep hard coal mining. High dynamics in mining, however in archived pictures that have been geometrically corrected, landscape development becomes challenging due to the absence of a digital terrain model that would be applicable to considering the date of imaging and the dwindling number of viable ground controls, due to territory undermining, the current.

522.AN AI-ENABLED FRAMEWORK FOR MICROBIAL QUALITY MONITORING OF RAW MILK THROUGH FEATURE-DRIVEN MACHINE LEARNING

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Dairy product quality and customer safety depend on the microbial level of purity. In this study, the authors have used five important quality attributes, such as pH, temperature, fat content, colour, and odor, to develop machine learning-driven predictive approaches. The data for this study have been obtained from Salem Aavin Union, Tamil Nadu Co-operative Milk Producers. They used four different machine learning algorithms, such as Decision Tree (DT), Multi-class Support Vector Machine (M-SVM), Random Forest (RF), and Ensemble Bagging Random Forest (EB-RF), to classify the raw milk samples into three quality classes, such as good, medium, and bad, based on microbial quality. The models' performance was assessed using conventional performance indicators and confusion matrices. The investigation shows that the EBRF classifier performed

better than the other models in terms of accuracy and category-wise prediction. It predicts the sample as good, medium, and bad with 98.40%, 93.27%, and 95.28% accuracy, respectively. These findings suggest that the ensemble-based technique improves prediction consistency and provides a quick, non-destructive way to evaluate microbial quality, which makes it ideal for applications in the dairy industry.

523.AI-ENHANCED REAL-TIME COLLABORATIVE IDE WITH WORKSPACE ISOLATION AND AUTOMATED CODE INTEGRATION FOR SOFTWARE DEVELOPMENT

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The development of collaborative software is a growing trend to employ several or more developers to work on common codebases simultaneously and thus, merge conflicts, inconsistent execution environments, slow integration testing, and low productivity are frequent results. Currently, the tools handle these problems individually in real-time editors, container development tools, or AI code assistance. Nevertheless, the integrated system of real-time synchronization, separate execution, and intelligent integration assistance is still scarce. It is a paper about an AI-enhanced real-time collaborative Integrated Development Environment (IDE) that combines Conflict-Free Replicated Data Type (CRDT)-based synchronization to provide conflict-free editing, Docker-based workspace isolation to provide consistent execution, and AI based analysis to provide continuous code quality assessment and early detection of merge-conflicts. The suggested system assists in automated verification of integration, proactive conflict notification, and productivity analytics by means of real time project monitoring. Experimental analysis shows that the number of merge conflicts and environment-related failures is reduced substantially in addition to the fact that the collaboration latency and the overall development efficiency is enhanced especially as compared to traditional collaborative workflows.

524.CLOUDCOVER AI: ML-POWERED REAL-TIME DATA MASKING IN CLOUD STORAGE FOR GDPR/DPDP COMPLIANCE

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The penetration of cloud computing in organizations in rapid pace has heralded complete transformation in the way organizations handle and store data; it has also subjected organizations to intense scrutiny with respect to privacy and security issues and global compliance in regards to regulatory standards. The application of the conventional procedures in the processing of Personally Identifiable Information (PII) and Protected Health Information (PHI) exposes them to higher risks. These techniques, that is the utilization of post-storage masking or the usage of third-party services (that enables the exposure of raw data in the intermediate phases) ultimately end up causing higher dependency levels which lead to compliance failures. In order to address those issues, this paper suggests CloudCover AI: a machine learning-based cloud-native structure that allows real-time data masking. The fundamental components of the system are NLP models which are placed at the locations of data entry and are prospectively used to detect and anonymize sensitive entities prior to being stored in the cloud. That is how raw data is not exposed to the external environment of the organization. The framework can be used with little effort within the existing cloud activities and ensure that audit and regulatory compliance continue with the General Data Protection Regulation (GDPR) and Digital Personal Data Protection Act (DPDP) is upheld. Experimental measures indicate a great masking degree with low processing time and excellent compliance assessment with a substantial population of test cases. Smart automation and regulatory synchronization would therefore offer a deep-rooted solution to business within the healthcare sector, the financial sector, government and corporate sectors, thus eliminating extensive threats of data breach as well as rapid operational flow.

525.URBAN FLOW: AI-EDGE ENABLED ADAPTIVE TRAFFIC SIGNAL CONTROL

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Rapid urbanization drives cities to continually face higher delay times, gridlocks, and urban area emissions. Unresponsive, old signal control systems don't adjust to real-time traffic control situations, but manage control based on a preset schedule. In this paper, we outline Urban Flow, developed AI edge adaptive traffic signal control systems which aim to improve urban mobility. Traffic control via video analysis and pedestrian sensors mark real-time vehicular traffic, construction queues, and control pattern movements. In order to minimize latency, we embed lighter deep learning modes to edge devices, which allows near real-time decision-making

systems to operate independently of the cloud [1]–[3] . Automated adaptive control traffic signal shifts help to eliminate time, and cut help traffic and excessive fuel consumption. Experimental simulations prove that our devices and adaptive algorithms exceed the traffic control performance in average traffic flow and vehicle delay time [4], [5]. Smart cities will appreciate Urban Flow for the safe and adaptable, energy-positive systems. More significantly for their capability to revolution urban traffic systems, turning them into intelligent sustainable transport networks [6].

526.CMOS SPIKING NEURON BASED LIGHTWEIGHT CRYPTOGRAPHIC KEY GENERATOR

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The rapid development of Internet of Things (IoT), wearable electronics and biomedical devices entail constant transmission of wireless data. This exposes such devices to spoofing and unauthorized access. Classical cryptography utilises more resources and power. There is demand of lightweight and energy efficient cryptography. The traditional cryptography algorithms like the AES, RSA and ECC are extremely secure, yet possess great complexity in computing, power consumption and memory overheads that cannot be allowed on resource limited hardware. This paper proposes a CMOS spiking neuron based lightweight cryptographic key generator, which takes advantage of the random behaviour of neuromorphic circuits to generate secure keys. It is modelled based on the Leaky Integrate and Fire (LIF) neuron model which is executed in CMOS compatible hardware logic and prototyped on an FPGA platform. The stochastic nature of spike timings and firing patterns is taken as a real source of entropy, which is not based on deterministic pseudo-random number generators. This brain inspired system will minimise the power consumption of hardware footprint and maximise entropy. There is parallel operation of multiple spiking neurons and the spikes of the neurons are then encoded to give binary key sequences. Verilog HDL is used to simulate the proposed system and ModelSim and FPGA synthesis tools are used to validate the system. Through experimental results, it has been indicated that there is low hardware overhead, low power consumption and high-quality randomness applicable in cryptographic applications. The paper defines neuromorphic spiking neurons as a hardware alternative to implementing lightweight cryptography key generation.

527.VIBES VISUALLY IMPAIRED BENEFICIAL EMPOWERMENT SYSTEM

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Visually impaired individuals face challenges in navigating through unfamiliar environments safely and reading information such as books and medicine labels. VIBES solves these challenges by giving independence with the ability to transform an ordinary smartphone device into an intelligent assistant for the visually impaired. The AI-enabled solution combines innovative computer vision and speech algorithms in a single, user-friendly mobile web application. This enables the visually impaired to navigate their environment safely, interpret their surroundings, and interpret both print and digital texts with audio feedback. Barriers are identified in real-time by YOLOv11n, with an estimation of its distance, speed, and whether it is on the left, right, or directly ahead. It even identifies risks in the ground, like pits. BLIP provides the natural scene description, while Tesseract OCR reads English and many Indian languages. Everything is conveyed to the user in natural-sounding audio via gTTS. With a responsive HTML/CSS/JavaScript frontend and a FastAPI backend, VIBES works well on regular smartphones, with execution times constantly below 1.5 seconds. User tests demonstrated high accuracy, including 91% mAP for detection, fast processing, and real-world utility, proving that accessible tech didn't have to be expensive or complicated. VIBES bridges the gap between human limitations and AI capabilities, supporting a more inclusive world.

528.DEVELOPMENT OF AN ALGORITHM TO DETECT THE TYPE OF ACOUSTIC SIGNALS IN UNDERWATER MARINE ENVIRONMENTS

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-The marine environment contains numerous marine organisms(whale, dolphin, shark), natural sound's(waves, rain, marine animals),man-made sound's(ships, sonar, submarines) etc. There is a need to analyze these sounds in order to protect ourselves from hazards. Many methods are available to observe these things. Even though these methods are available they are quite difficult to understand and implement. To overcome this an algorithm

has been developed using python. This method is easy to understand and implement, making it helpful for researchers working in the field of marine acoustic signal.

529.SMART TRAFFIC MANAGEMENT SYSTEM USING

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Nowadays, traffic jams have become a big problem in our daily lives because there are more cars on the road and long delays between traffic lights. Most current systems use fixed timing to control traffic signals, which isn't very efficient. There's also an issue when emergency vehicles, such as ambulances or fire trucks, have to go through during busy periods. They often have to wait, which can be dangerous. We need a smart traffic system that can adjust signal timing based on how many cars are on the road. Our project is designed to reduce waiting times at traffic lights by checking how many vehicles are in each lane and setting green light times accordingly. It also helps detect emergency vehicles and gives them priority. The goal of our project is to make traffic flow smoother, reduce delays, and ensure that emergency vehicles can pass quickly without stopping at traffic signals.

530.ADDRESSING CHALLENGES IN AI-DRIVEN SAP IMPLEMENTATIONS

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AI-enabled digital transformation is accelerating the evolution of enterprise systems such as SAP S/4HANA, SAP BTP, and SAP Success Factors. Integrating Artificial Intelligence (AI) with SAP promises enhanced automation, predictive analytics, improved decision-making, and operational efficiency. However, real-world implementations continue to face significant challenges rooted in data quality, integration complexity, governance, change management, explain ability, and model lifecycle maintenance. This paper analyzes the major obstacles encountered during AI driven SAP implementations and proposes a structured, five-layer implementation framework for enterprises. Through a case-based analysis and synthesis of academic and

industrial findings, this study provides organizations with a roadmap to reduce project risk, improve AI adoption success, and maximize business value when embedding AI capabilities within SAP landscapes.

531.OPTIMIZATION OF THE POWER SYSTEM VIA THE SERIES {FACTS} CONTROLLER

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The enhancement of power system performance has become an essential aspect of modern electrical engineering, especially with the increasing demand for stability and efficiency in power networks. Series {FACTS} controllers, including devices such as the 'Series Static' Synchronous Compensator (SSSC) as well as the 'Thyristor Controlled' Series Capacitor (TCSC), are pivotal in improving the transmission system's power flow, voltage stability, and overall reliability. These controllers are strategically placed in the series path of transmission lines to regulate the power flow, mitigate voltage sags, and dampen oscillations, thereby improving the performance and operational flexibility of the grid. This paper explores the various applications of series {FACTS} controllers in enhancing system performance by reducing line losses, increasing transmission capacity, and preventing potential cascading failures. Through simulations and case studies, the effectiveness of these controllers is demonstrated in optimizing power system efficiency under various operational conditions, particularly during load disturbances and fault conditions. The findings demonstrate the possible advantages of using series {FACTS} controllers, providing a dependable way to satisfy the constantly rising need for stable and effective power systems. The 'power' system's operation has been examined via the 'IEEE' 14-(Bus) Network.

532.TRUST AS A MEDIATOR TECHNOLOGY ACCEPTANCE OF DIG-ITAL HEALTH PLATFORMS: EMPIRICAL EVIDENCE FROM IN-DIA

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To study and examine the factors influencing technology acceptance of digital health platforms in India through user trust as a mediating role. To investigate how perceived usefulness, perceived ease of use, privacy protection, and security assurance conforming behavioral intentions through trust in the rapidly evolving digital health care ecosystem in India. Design/Methodology/Approach: Developed an extended Technology Acceptance Model (TAM) was developed, incorporating trust as a mediating variable. Primary data was collected from 263 existing users from India through a structured online questionnaire. The study employed descriptive statistics, Cronbach's Alpha, independent sample T-test, one-way ANOVA, Pearson correlation analysis, linear regression analysis, mediation analysis was conducted using Jamovi. Findings: The study found that perceived ease of use significantly influenced trust ($\beta = 0.155$, $p = 0.003$) and behavioral intention, with 72.1% of its effect mediated through user trust. The study also found user trust as a strong predictor of behavioral intention ($\beta = 0.729$, $p < .001$). Perceived usefulness showed a negative correlation with trust ($r = -$

0.257, $p < .001$), suggesting that usefulness alone is not significant in building trust among privacy concerns. The study observed significant variations in the demographic variables and education level which have an impact on all the variables ($p < .001$).

Originality: This study provides an integrated framework by positioning trust as a mediating role between TAM and technology acceptance in Indian digital healthcare, and addresses a critical gap in a holistic examination of adoption ways.

Limitations: The sampling method limits generalizability, and there is reliability issue with the security assurance measurement scale. A cross-sectional research design limits the understanding of technology adoption evolution. Future re-search should employ a stratified sampling method and adopt a longitudinal re-search design.

533.AI-BASED PRE-SYMPTOM ANOMALY DETECTION FOR RABIES RISK IN STREET DOGS USING MULTIMODAL BEHAVIOR ANALYSIS

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Rabies is a major, but preventable, global public health concern that is mostly caused by household and stray dogs. The existing detection techniques are mostly reactive in nature and therefore the disease is only detected once the clinical symptoms present thus crippling the ability to intervene in time and contain it. The paper describes an artificial intelligence-driven model of the pre-symptom detection of anomalies in street dogs through the use of multimodal behavior analysis. The proposed system combines two different data streams: high-resolution video of closed-circuit television (CCTV) to observe macro-behavioral changes, and time-series physiological data (i.e. jaw tremor, heartbeat and breathing pattern) measured by a non-invasive leash-mounted sensor device. A You Only Look Once (YOLO) trained network is used to analyze the visual stream to give gait and salivation anomaly information, and a Convolutional Recurrent Neural Network (CRNN) is used to analyze sensor data. Both networks are combined and fed to a One-Class Support Vector Machine (OC-SVM) in order to continuously calculate an anomaly risk score. The architecture will detect physiological and behavioral abnormalities with a high likelihood of causing a symptom that could be treated in quarantine, indicating a very important window of time. The assessment shows that this type of multimodal fusion has much higher accuracy and, more importantly, time-to-detection of the risk of rabies than that of a single-modality system.

534.AI POWERED CAREER RECOMMENDED SYSTEM

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Intelligence-based Career Recommendation System, tailored to meet the requirements of Class 10, Class 12, and individuals seeking employment. The approach used by the proposed system is based on collecting academic scores, responses to an aptitude test, reasoning, and results from a puzzle-based reasoning test, along with a career-based test, domain interest, and CGPA, in the case of individuals seeking a job. The Random Forest Classifier is used, keeping in view various feature variables, to assess user profiles and determine suitable domains that can be of great use to Class 10, Class 12, as well as individuals looking out to grab a job, thereby recommending skills, learning resources, recruitment organizations, undertaken by an individual, keeping in view a suitable domain of interest, thereby promoting accurate informed decisions, thereby being a great platform that can be adopted by individuals concerned. The system that is proposed offers flexibility in terms of assessment, since the user can opt for an aptitude test or any puzzle-based reasoning test. Therefore, it makes sure to assess fairly by considering an individual's skills rather than their opinions or any kind of influence, which would help the student/user make the right career choices with confidence.

535.MULTI-DISEASE DIAGNOSIS BY CLASSIFICATION AND LOCALIZATION

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This aims to creating a strong representation of lesions is necessary for classifying and locating diseases in medical image analysis. Existing prototype-based models typically rely on single-level, fixed-size prototypes by the algorithm of ProtoPNet and ProtoTree and often suffer from prototype redundancy, making it difficult to effectively handle the complexity of diverse lesion characteristics. This system introduces HierProtoPNet, a new prototype-based framework designed to address this challenge by leveraging hierarchical visual prototypes across different semantic feature granularities to effectively capture diverse lesion patterns. It creates prototypes at multiple semantic levels (hierarchical layers of a CNN). Low level prototypes capture texture or colour variations. Mid-level prototypes: capture edges or patterns. High-level prototypes: capture lesion shape or structure. This helps the model handle diverse lesion scales and features. To prevent redundancy and increase the utility of the prototypes, prototype mining paradigm to progressively discover semantically distinct prototypes, offering multi-level complementary analysis of lesions. Instead of learning all prototypes at once, HierProtoPNet progressively mines new prototypes. It ensures each new prototype is semantically distinct from previous ones. This improves prototype diversity and reduces overlap. Additionally, they introduce a dynamic knowledge distillation strategy that allows transferring essential classification information across hierarchical levels, Information from higher-level prototypes is transferred to lower-level prototypes thereby improving generalization performance.

536.MULTI-STAGE ADVERSARIAL DEFENSE FOR ONLINE DDOS ATTACK DETECTION SYSTEM IN IOT

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Machine learning (ML) models play a crucial role in detecting Distributed Denial of Service (DDoS) attacks within Internet of Things (IoT) networks. However, these models are highly susceptible to subtle adversarial attacks that manipulate input data to evade detection, severely reducing their reliability in real-world deployments. Traditional defense strategies are typically limited to offline or batch-based mechanisms, which are inadequate for addressing multiple, evolving, and unknown adversarial threats in real-time IoT systems. To overcome these challenges, we propose the Multi-Stage Adversarial Attack Defense (MSAAD) framework—a dynamic, multi-layered defense system designed for robust, online protection. MSAAD integrates three core components: the Resilient Adversarial Detector and Purification (RADP) module, which identifies and purifies adversarial perturbed traffic; a multiple classifier layer, which enhances system diversity and obfuscation; and a Multi-Armed Bandit (MAB) mechanism employing Thompson Sampling to adaptively select the optimal Défense configuration for each incoming request. Experimental results on the IOTID20 and CICIOT2023 datasets demonstrate that MSAAD significantly enhances detection robustness, improving the MLBTSE-based detector's accuracy under adversarial conditions from as low as 32.38%–60.58% to an impressive 99.01%–99.48%. This confirms MSAAD's effectiveness in delivering resilient, high-accuracy DDoS Defense in live IoT environments.

537.HYBRID GA–PSO OPTIMIZED RANDOM SI/SIO2 1D PHOTONIC CRYSTAL BIOSENSOR FOR ESTROGEN AND PROGESTERONE DETECTION

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One-dimensional photonic crystal (1D-PC) sensors have gotten a lot of attention because they can strongly confine light and are very sensitive to changes in the refractive index. However, traditional periodic photonic crystals frequently demonstrate restricted tunability and moderate sensing efficacy. This paper suggests and improves a randomized Si/SiO₂ one-dimensional photonic crystal bio sensor using a Hybrid Evolutionary Swarm Optimization (HESO) framework that combines Genetic Algorithm (GA) and Particle Swarm Optimization (PSO). The GA enables global exploration of multilayer permutations to identify high quality resonant configurations, while PSO performs rapid local refinement of layer thickness parameters to maximize sensitivity and spectral sharpness. The optimization simultaneously targets structural permutation, Si/SiO₂ thickness tuning, and bio-layer thickness enhancement to improve light–analyte interaction. The optical response is analysed using the Transfer Matrix Method (TMM) under normal incidence in the near-infrared range. The optimized configuration demonstrates significantly enhanced sensitivity, reduced FWHM, and improved Q-factor. The sensor is tested to see if it can find changes in the refractive index of progesterone and estrogen that are linked to polycystic ovary disorder (PCOD). This shows that it is good for high-resolution biomedical sensing applications.

538.GRAD-CAM BASED EXPLAINABLE TRANSFER LEARNING FOR BRAIN TUMOR DETECTION

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Recent deep learning architectures that have achieved remarkable accuracy in medical image classification. However, they frequently encounter challenges such parameterization interpretability, which as and excessive Reduced hinder their integration into the real-world clinical applications. To address these limitations, this study introduces an explainable deep learning framework that leverages transfer learning using VGG16 and EfficientNetB0 models for tumor categorization. The proposed approach enhances clinical reliability by integrating visual interpretability mechanisms that highlight tumor-specific regions, thereby fostering clinician trust in automated predictions. Experimental analysis reveals that the EfficientNetB0 model attains a training accuracy of 97.41% and a testing accuracy of 75.89%, surpassing the performance of the VGG16 based counterpart. This work underscores the balance between model accuracy, interpretability, and computational efficiency, advancing the development of transparent and reliable AI driven diagnostic systems for clinical environments.

539.ELECTRONIC BRUSH FOR PLAQUE REMOVAL: A SURVEY OF SENSING, IMAGE/SIGNAL PROCESSING, AI AND ACTUATION APPROACHES

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Dental caries and periodontal disease are mostly caused by oral plaque buildup. Conventional manual brushing relies on user technique and lacks feedback; electronic or “smart” brushes aim to detect plaque, guide brushing, adapt cleaning parameters, and record oral hygiene metrics. This paper surveys sensing modalities for plaque detection (optical, fluorescence, impedance, pressure, acoustic), image and signal processing pipelines used to detect and localize plaque, machine learning. AI strategies for classification and personalized guidance, and actuation/control approaches for adaptive brushing. Challenges such as robustness across users, safety, miniaturization, regulatory concerns, and data privacy are discussed. The survey concludes with open problems and future research directions to enable clinically effective, user friendly electronic brushes.

540.FARMVISION: AI-BASED FRUIT DISEASE DETECTION AND MANAGEMENT PLATFORM

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India counts agriculture as one of its most important sectors, and fruit has the biggest share of the pie of its support to the economy. After all fruits, the pomegranate is the one that has the largest market share mainly thanks to its nutritional and medical properties. But, besides the much commercialized pomegranate fruit, the

productivity and quality of the latter are consistently brought down by diseases, some of which cannot even be noticed by the naked eye at their early stages. The paper at hand would like to present FarmVision: An AI-based Fruit Disease Detection and Management Platform, which is mainly aimed at the pomegranate fruit sector through disease detection and management.

The system works through Convolutional Neural Network model which take in the fruit pictures and determine what kind of disease the fruit is suffering from. The dataset that the model is trained on includes a thoroughly selected collection of pomegranate fruit images, making it confident in its ability to tell apart the diseases and get the right classification of the fruits as healthy or diseased. The capability of the system of blending a Flask backend with a ReactJS frontend has introduced a very engaging and friendly user interface not only for farmers but also for the whole agricultural community.

The experiments show that the model has very high accuracy and is very efficient in real-time disease detection. The proposed method is a platform that is a cost-effective, scalable, and smart solution for the monitoring of the health of pomegranate fruits and the increase of the productivity of farms overall.

541.NOVEL RESEARCH COMPARING GENAI – LORA BASED FINE-TUNED MODEL VS GENERALIZED STACKED MODEL FOR EFFICIENT LEAD CONVERSION

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Lead conversion is an important factor that enhances the sales performance in online education and marketing systems. Through online campaigns, organizations get huge customer leads that could lead to a large number of prospective customers, although very few such leads translate to paying customers. Proper identification of high potential leads at the early stage can mean a lot in terms of minimizing the waste of resources and enhancing the general performance of revenues. This paper is a comparative study of two smart methods of conversion prediction of leads, a generalized stacked ensemble framework and a Low-Rank Adaptation (LoRA) based z-based Generative AI fine-tuned model. The stacked model combines various supervised learning algorithms and a neural network meta-learner to improve predictive stability and the LoRA-based model allows performing efficient domain adaptation at a lower computational cost. Evaluation on structured lead interaction data using experimental evaluation methods proves that both methods enhance the reliability of classification, which can provide scalable and data-driven solutions to the current sales decision support system.

Keywords: Lead Conversion Prediction, machine learning, stacked generalization, ensemble learning, generative AI, Low-Rank Adaptation (LoRA), meta-learning, Sales Analytics, Classification Models, Predictive Modeling.

542.IMPACT OF E-SERVICE QUALITY ON CUSTOMER SATISFACTION AND REPEAT PURCHASE INTENTION IN E-COMMERCE PLATFORMS

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This is an empirical study that discovers the relationship among E-service quality, customer satisfaction, and their effect on repeat purchase intention, in the context of e-commerce platforms. A quantitative cross-sectional

study was conducted, involving 305 respondents. The questionnaire was distributed using a 7-point Likert scale. Statistical checks, such as reliability, correlation, regression, and SEM, were used with the assistance of Python analysis. The results of the study indicate that the E-service quality has an internal consistency of 0.931, which could be very high. It additionally shows that there is a full-size prediction of customer satisfaction through E-service quality, with a coefficient of 0.846 and R^2 of 0.716. Customer satisfaction becomes additionally determined to mediate the connection between E-service quality and repeat purchase intention, explaining 75% of the variance.

543.MEDIVOYAGE: A MACHINE LEARNING APPROACH FOR PERSONALIZED TRAVELER HEALTH RISK ASSESSMENT

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Conventional travel health advisories are largely generic and do not consider unique individual medical histories and destination-specific environmental conditions. This paper introduces a machine learning framework for personalized traveler health risk prediction based on demographic, medical, environmental, and behavioral features. Due to the limited availability of comprehensive real-world travel health records, a large-scale synthetic dataset was generated to simulate realistic travel scenarios while preserving privacy. Multiple tree-based machine learning models, including Decision Tree, Random Forest, XGBoost, and LightGBM, were evaluated and compared using consistent feature sets and evaluation metrics. Experimental results demonstrate that gradient boosting based models outperform simpler tree-based approaches, with LightGBM achieving the best balance of predictive accuracy, robustness, and computational efficiency. The final system adopts LightGBM for disease-specific risk prediction and incorporates model explainability using SHAP to provide transparent, user-level insights. The proposed framework offers a scalable and interpretable solution for personalized travel health risk assessment, supporting proactive healthcare decision-making and enhanced traveler safety.

544.VOICEPRINT-BASED HARDWARE AUTHENTICATION SYSTEM WITH SPOOF DETECTION

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Voiceprint authentication is an effective biometric security solution that uses distinctive vocal traits for authentication. This paper presents a hardware-assisted voiceprint authentication system that incorporates spoofing detection, behavioral voice biometrics, self-supervised edge learning, and active liveness checks to effectively defend against replay attacks, AI-based attacks, and voice conversion attacks. The proposed system uses a hybrid multi-domain feature extraction strategy that combines MFCC, spectral-temporal features, and transformer-based speaker embeddings, as well as behavioral features like articulation rate, rhythm, and micro prosodic patterns to improve spoofing resistance. A hybrid CNN BiLSTM network with attention mechanisms is used to identify temporal-spectral irregularities in spoofed speech, and a contrastive self-supervised edge learning module is used to continuously improve speaker embeddings on the edge device, ensuring adaptability and privacy without relying on cloud services. A challenge-response protocol is also used to further secure against replay attacks. The proposed system, developed using a microcontroller-microphone interface with a Raspberry Pi edge processor, reports 96.4% authentication accuracy and 98.6% spoofing detection accuracy, showing excellent performance and real-time capability for IoT and embedded systems.

545.HYBRID TRANSFORMER-BASED AUTOMATED DEPRESSION DETECTION USING TEXT ANALYSIS

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Depression is among the most prevalent mental illnesses, yet its timely and proper diagnosis is hard to achieve. Text-based computational methods have evolved into an alternative for psychological assessment, given the increase in online communication. This study explores automated depression detection through linguistic patterns, sentiment clues, contextual embeddings, and hybrid feature-fusion methods. Previous studies highlight the importance of psychological tone, writing manner, and meaning structure in pointing out depressive traits, while recent technologies such as transformer encoders and graph-based models capture subtle psychological hints. The study proposes an integrated text-based detection system with strong preprocessing, specific feature extraction, and skilled classifiers. It also points out key obstacles, including the need for diverse datasets, transparency, and reliability across platforms for advancing text-driven mental-health screening.

546.EMOTION-AWARE TOURISM RECOMMENDATION SYSTEM USING MULTIMODAL DEEP LEARNING

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Most tourism recommendation systems rely on his- torical user behavior and static preference models, limiting their ability to respond to a user's immediate emotional state, intent, and situational context. In view of the limitation, this work develops a context-aware tourism recommendation framework that incorporates facial emotion recognition, textual intent un- derstanding, and location-based contextual filtering into one unified multimodal deep learning pipeline. Facial emotion cues are drawn from either live camera captured images or user uploaded photographs for real-time inference about the affective state. In parallel, transformer-based natural language models will analyze user-provided text for travel intent and sentiment identification. Geographic information is used as a contextual constraint rather than a standalone predictor, allowing the system to emphasize destinations that are both emotionally aligned and spatially relevant. The designed architecture is modular, allowing for separate processing of visual, textural, and contextual infor- mation and the effective fusion of features for recommendation generation. The central contribution of the current study is the systematic exploration of the fusion of emotional, semantic, and spatial information and its testing for impact on the relevance of recommendations. The experimental results carried out on practical datasets related to the tourism domain show that the fusion of emotion and intent information into the multimodal context is effective compared to the unimodal strategy and leads to an increase in applicability through the application of location filtering to highlight destinations that can be easily accessed.

547.SECURE ONLINE TRANSACTION SYSTEM WITH CRYPTOGRAPHY : BUILDING TRUST IN DIGITAL PAYMENTS WITH CYBERSECURITY TECHNIQUES

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The rapid digitization of financial ecosystems has transformed how users perform transactions, but it has also exposed critical vulnerabilities in data confidentiality, authentication, and fraud prevention. Traditional online payment systems often rely on centralized architectures prone to data breaches, phishing, and insider attacks. To address these challenges, modern secure transaction systems integrate advanced cryptographic primitives such as symmetric and asymmetric encryption, hash-based integrity verification, and digital signatures to ensure end-to-end protection. This paper presents a comprehensive study of a cryptography-driven secure online transaction model that combines Transport Layer Security (TLS) protocols, tokenization, and two-factor authentication to safeguard digital payments. The proposed system emphasizes trust establishment through layered encryption, zero-knowledge verification for identity protection, and homomorphic encryption for confidential data analytics. By integrating cybersecurity intelligence with cryptographic resilience, this work aims to build a transparent, tamper-resistant, and user-trusted foundation for next-generation digital payment infrastructures.

548.EFFICIENT MULTI-AUTHORITY ACCESS CONTROL USING ATTRIBUTE-BASED ENCRYPTION IN CLOUD STORAGE

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Cloud storage has become a widely adopted solution for managing large-scale digital data due to its scalability, cost efficiency, and accessibility. However, outsourcing sensitive information to third-party cloud environments

introduces significant security challenges, including unauthorized access, data leakage, and vulnerabilities within distributed storage frameworks [6], [8]. Existing Hadoop-based and cloud storage systems often lack comprehensive built-in encryption and robust access-control mechanisms, making them susceptible to security breaches at the storage layer [10]. Traditional encryption techniques provide confidentiality but do not support flexible, fine-grained access control in multi-user cloud environments. Single-authority Attribute-Based Encryption (ABE) schemes improve access management but introduce centralized trust dependency and key-escrow risks [1], [10]. To address these limitations, this paper proposes a Cloud Secure Storage Mechanism based on Multi-Authority Ciphertext-Policy Attribute-Based Encryption (CPHABE), integrated with hybrid encryption and data dispersion strategies. The proposed framework distributes attribute management across multiple authorities to eliminate single-point compromise, incorporates Key Encapsulation Mechanism (KEM) and Authenticated Encryption (AE) to ensure confidentiality and integrity, and applies encrypted file fragmentation across distributed cloud nodes to minimize leakage risk [5], [10]. A transformation-key-based lightweight decryption mechanism reduces computational overhead on the user side while preserving strong cryptographic guarantees. The system architecture consists of four primary modules: User Frame, Authority, Cloud Server, and Data Owner. By combining decentralized access control, hybrid encryption, and secure distributed storage, the proposed model enhances confidentiality, strengthens resistance to unauthorized access, and provides a scalable security framework suitable for modern cloud storage environments.

549.PERFORMANCE EVALUTION OF REINFORCEMENT BARS BY USING GRAPHENE COATING

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Reinforced concrete buildings require strength and durability from re-bar, and older rebar made of steel is vulnerable to corrosion which reduces service life. The purpose of this study is to use reduced graphene oxide (rGO) as a surface coating material for rebars, ensuring they perform well. Two sets of 12 mm diameter Fe550D grade steel rebars were prepared, with one set as uncoated Fe550D grade rebars and the other set as rGO coated Fe550D grade rebar. Mechanical tests including tensile, impact, bend, and pull-out tests, were completed to assess strength, ductility, and bond characteristics and a salt spray test was used to confirm corrosion resistance. The results show that rGO coated rebars had a 6% to 8% improvement in tensile strength and bond strength while maintaining ductility and corrosion resistance with minimal rust formation in the salt spray test. Overall, graphene coating improves mechanical properties and durability. If applied, it will significantly improve the corrosion resistance and performance of reinforced concrete structures before the structures even start.

550.REAL-TIME BOAT SIMULATION IN UNITY 3D WITH GAMEPAD CONTROL AND AI NAVIGATION FOR DATA ANALYSIS

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This research presents a real-time boat simulation system developed in Unity 3D to analyze marine navigation under both manual and autonomous control modes. The simulator integrates a physics-accurate water environment featuring buoyancy forces, hydrodynamic drag, thrust, and torque-based rotation, enabling realistic vessel behavior. Manual control is implemented through gamepad input using Unity's Input System, offering smooth and responsive steering that reflects real-world boat handling. An AI navigation module, built using waypoint tracking and optimized steering algorithms, autonomously guides the vessel through complex routes

with high precision. To support quantitative evaluation, the system records detailed telemetry data—including position, velocity, path deviation, and lap completion time—for both human and AI runs. Comparative analysis demonstrates that the AI-driven agent achieves smoother trajectories, lower path deviation, and improved lap times compared to human navigation. The proposed simulation framework provides a cost-effective, flexible, and scalable platform suitable for marine research, autonomous navigation development, educational training, and performance analytics. Its modular design supports future extensions such as reinforcement learning, dynamic weather modeling, digital-twin integration, and multi-agent simulations.

551.AI-BASED CHATBOT FOR STUDENT SKILL ASSESSMENT, CAREER GUIDANCE, AND JOB RECOMMENDATION

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This research is about designing a smart assistant powered by Artificial Intelligence (AI) that can combine performance prediction, career recommendation, and skill-gap analysis for student decision-making. The suggested approach relies on the multi-modal academic, behavioral, textual, and temporal data, apart from advanced preprocessing, also contains optimized feature selection and a hybrid TGNN BiLSTM model for precise performance prediction. A career suggestion system based on the Knowledge Graph provides awareness of the career-related context, whereas a Siamese Neural Network skillfully detects the individual skill gap and suggests the perfect learning material. The integrated system is more stable concerning prediction, and the recommendation is relevant, as well as skill-gap identification. In sum, the work asserts that combining multi-format data with sophisticated AI models represents a complete, modifying, and dependable way of support. The framework is significant since it advances aspirants' readiness for the labour market, facilitating the provision of orientation services and delivering personalized educational and career interventions virtually endlessly to a large number of beneficiaries.

552.IMAGE CLEARNESS PROCESSING FOR IMAGE RESTORATION BASED ON GENERATIVE ADVERSARIAL NETWORK

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Facial image restoration of noisy images, blurred, low-resolution, compression artifact and aging images is an arduous issue in computer vision. Conventional image processing and methods based on convolutional neural networks usually do not recover fine-frequency features of a face and yield smooth and over-smoothed outputs with low identity recovery. In order to overcome these shortcomings, this paper introduces a strong facial image restoration architecture using Generative Facial Prior Generative Adversarial Networks (GFPGAN). The suggested system incorporates a pretrained StyleGAN2 facial prior before instructing the restoration procedure which allows it to restore semantically significant facial features including eyes, skin texture, and structural contours even in the case of severe degradation. In order to achieve the enhancement of the entire image, RealESRGAN is used to enhance background and those parts of the picture which are not faces and it generates high-resolution and visually similar results. The framework facilitates multi-platform implementation, such as command-line interfaces, web-based applications, and inference pipeline in the cloud. Empirical testing proves that the suggested solution is much more effective than the conventional CNN-based and GAN-based restoration techniques in the context of perceptual quality, face identity maintenance, and resistance to in-the-field

degradation. The findings confirm the efficiency of using generative facial priori and adversarial learning to have viable image restoration applications.

553.SMART AI-BASED ADAPTIVE TRAFFIC MANAGEMENT SYSTEM

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Traffic congestion in cities, when we look at the increasing number of vehicles on the road and rapid urbanization we're faced with a very serious issue. Regularly used traffic management systems, reliant on fixed signal timings, can't cut it anymore when it comes to dynamic traffic patterns. In an attempt to combat this problem, we've proposed a Smart AI-Based Adaptive Traffic Management System that marries the precision of deep learning with the connectivity of the Internet of Things. It's real-time traffic monitoring and control solution that puts the YOLO object detection algorithm to work, breaking down live video feeds from a ESP32-CAM module to count and track the number of vehicles. Coming racing out of the gates, the first phase of this system zeroes in on accurate vehicle counting and calculating traffic density, and the overall system is equipped with adaptive signal control, emergency vehicle priority, and flexible lane management. The results demonstrate a real-time stable system, making the feasibility of this system for real-life applications in smart traffic networks now beyond dispute.

554.BENCHMARKING ROBUSTNESS OF LTL-BASED E-COMMERCE USER BEHAVIOR VERIFICATION UNDER SESSIONIZATION HEURISTICS

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The complete user session reconstruction from broken e-commerce server logs requires accurate data, which enables researchers to conduct thorough behavior studies, but current research fails to establish how different sessionization methods, which include various timeout settings, affect formal modeling outcomes. The study evaluates how well Linear Temporal Logic (LTL) property verifications perform when testing three different sessionization methods, which include Classic, Referrer-Aware, and Aggressive, using a massive real-world dataset that contains 35 million original log entries. The proposed pipeline uses strict noise elimination methods together with multiple sessionization techniques and official event abstraction methods to convert HTTP requests into their corresponding semantic functions. The research results show that core behavioral metrics maintain high stability through standard methods, which demonstrate only 1% relative change during crucial assessments that include conversion funnel drop-off measurement. The system demonstrates exceptional performance through its internal search mechanism, which achieves a resolution rate of 78.6% for search queries. The system employs a multi-method statistical framework, which examines temporal data, to detect 0.1% of sessions as unique anomalies (n=838), while successfully differentiating authentic high-intensity users from automated bot behaviors, which display interaction rates that exceed normal levels by 37 times. The results demonstrate that formal verification functions as a reliable assessment method, which maintains its strength under situations where data remains unknown, because it functions as a testable solution that competes with black-box statistical methods.

555.AI POWERED RECRUITMENT SYSTEM

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Recruitment systems are required to handle a massive number of resumes effectively and accurately. Conventional recruitment systems currently employed are based on keyword screening. However, this proves ineffective for semantic relationships among skills and requirements. This paper describes an AI-based recruitment system that incorporates an NLP technique for candidate screening and ML for screening and job matching. The proposed system extracts effective features from resumes and then measures their semantic scores for job requirements. Experimental results using 200 resumes and different job profiles have shown that the system achieves a better matching accuracy of around 18-22 Percent improvement over the conventional system. Screening time has been significantly reduced. This proposal introduces an AI-based recruitment system that carries out automated parsing of resumes, screening of candidates, and employment matching via Natural Language Processing and Machine Learning algorithms.

556.EXPLAINABLE MULTICLASS CERVICAL CELL CLASSIFICATION USING RESNET-18 AND SCORE-CAM ON LIQUID-BASED CYTOLOGY IMAGES

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Automated analysis of liquid-based cytology (LBC) images plays a vital role in transforming cervical cancer screening process more efficient and reliable. But, the large morphological variability of cells and the problem of interpretability of the model remains as an obstacle for the clinical use of such methods. In this paper, we propose an explainable deep learning framework for multiclass cervical cell classification using LBC images. A ResNet-18 convolutional neural network which is pre-trained on ImageNet, is fine-tuned to categorize cervical cells into four diagnostic classes such as high squamous intra-epithelial lesion (HSIL), low squamous intra-epithelial lesion (LSIL), negative for intraepithelial malignancy (NILM), and squamous cell carcinoma (SCC). The model performance is assessed on an independent test set by using macro-averaged precision, recall, F1-score, and area under the ROC curve (AUC), besides confusion matrix analysis to deal with class imbalance. Score-CAM is used to produce visual explanations that show the most discriminative regions that influenced model predictions in order to increase interpretability. The experimental findings reveal an accuracy of 95.86%, a macro-averaged F1-score of 91.74%, and a macro-AUC of 0.985, thus pointing to a strong classification performance as well as high discriminative capability. The coupling of quantitative assessment with interpretable visual cues paves the way for creating transparent and clinically valuable AI-assisted cervical

cancer screening systems.

557. MOLECULAR CROSSTALK BETWEEN PULMONARY AND CARDIOVASCULAR DISORDERS: A SYSTEMS APPROACH

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The comorbidity of cardiovascular disease (CVD) and chronic inflammatory disease (COPD) points to the possibility of their having common molecular drivers. In order to research these underlying factors, integrated analyses using GEO expression datasets, CTD – derived gene lists and network and pathway-based approaches were performed to uncover the inflammatory signaling hubs that overlap. Among the key regulatory to be identified, Interleukin-6 (IL-6) was a main node creating a union of the most important inflammatory pathways: NF- κ B, JAK-STAT signaling and endothelial activation through ICAM-1. The analysis of the network topology spotlight IL-6 as an important factor that connected immune signaling to vascular dysfunction. Moreover, profiling of the cytokines brought to light the concurrent existence of the disrupted pro-inflammatory and anti-inflammatory responses, thus pointing to the disturbed immune equilibrium and not a unidirectional inflammatory shift. This situation of conflicting immune signals might be one of the reasons why the diseases stay active and progress in both the pulmonary and cardiovascular systems. Put together, these results strongly urge the need to consider the IL-6-centered regulatory networks as potential therapeutic targets. In fact, these shared signaling hubs must be targeted in order to restore immune balance and come up with new ways of managing both lung and vascular inflammatory diseases.

558. ARTIFICIAL INTELLIGENCE AS A CATALYST FOR CULTURAL PRESERVATION AND CREATIVE INNOVATION

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This paper analyses the transformative impact of artificial intelligence (AI) technologies in documenting, conserving, and re-interpreting cultural heritage globally. With many museums facing unprecedented problems in preserving and making available to digitally native audiences the large collections they hold, AI presents itself as a key mechanism for bridging the gap between preservation and public engagement via the use of traditional preservation techniques and those of today.

Empirical evidence synthesized from current case studies of museum digitization projects, digital archive systems, and AI-driven conservation projects will be used to show how machine learning, computer vision, natural language processing (NLP), and immersive technologies allow for both the preservation of, and creative re-interpretation of, cultural artifacts.

The paper focuses on two complementary dimensions: (1) AI's application in preservation, including automated digitization, predictive conservation models, and community-based documentation; and (2) AI's function in creative innovation, supporting the creation of interactive and new artistic interpretations of cultural artifacts, which maintain cultural authenticity. An evaluation of the ethical, legal, and practical implications of AI-based cultural initiatives shows that only AI-based cultural initiatives that include community engagement, transparent governance models, and adherence to international standards (UNESCO frameworks, UN cultural rights protocols) can be successful.

The paper also demonstrates that when it is applied in a responsible manner, AI extends its technological capabilities to create a democratizing effect -- allowing under-resourced institutions to preserve cultural heritage at risk of being lost, reducing digital divides through multilingual access to digital platforms, and empowering source communities to control their cultural stories. The paper provides an interdisciplinary approach to the discussion of technology and cultural sustainability, and offers empirically based recommendations to

researchers, museum professionals, policymakers, and creative practitioners who are operating in the complex nexus of artificial intelligence, cultural identity, and digital innovation in the twenty-first century.

559. AN ELECTRIC VEHICLE'S WIRELESS POWER TRANSFER SYSTEM: DESIGN AND EVALUATION

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Wireless power transfer (WPT) for electric vehicles has become known as an appropriate replacement for traditional plug-in charging techniques, providing ease and a better experience for users. The WPT system's design and evaluation, mainly for a single EV application, are presented in this study. In order to allow effective energy transmission without the need for physical connectors, the system uses resonant inductive coupling between transmitter and receiver coils. For improved performance, important design factors such as operating frequency, coupling coefficient are examined. System efficiency is evaluated under load conditions and using analytical modelling and simulation. The study also identifies problems, such as losses and heat control, and suggests solutions. The results show the potential integration of WPT systems into electricity networks and intelligent transportation systems and confirm the practicality of implementing them for individual EVs. The proposed method improves convenience, enhances charging options, and supports the design of intelligent EV infrastructure for environmentally friendly transportation. System provides efficiency of 93%.

560. HUMAN- CENTRED VOICE INTERFACES FOR SMART HOME SYSTEMS

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Smart home systems are increasingly becoming part of everyday life, yet many existing solutions remain limited to basic appliance control. Human- Centred voice interfaces aim to bridge the gap between technology and natural human communication, offering intuitive, accessible, and adaptive control of household environments. By leveraging natural language processing (NLP), artificial intelligence (AI), and Internet of Things (IoT) technologies, these systems can interpret user intent, personalize responses, and enhance inclusivity for elderly and differently-abled individuals. This research explores the design, architecture, and evaluation of voice-driven smart home systems that prioritize user experience, adaptability, and seamless integration with daily routines.

561.A HYBRID MACHINE LEARNING AND DEEP LEARNING APPROACH FOR NETWORK ATTACK DETECTION

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A Hybrid Machine Learning–Deep Learning–based Network Attack Detection (HMLD-NAD) framework is introduced to improve detection performance and flexibility of network threat detection systems deployed within contemporary network infrastructures. The framework combines conventional machine learning classifiers for effective feature extraction and traffic classification with deep learning models to model intricate spatial and time-dependent attack behaviors. Machine learning techniques including Random Forest and Support Vector Machine are applied for preliminary traffic screening and feature refinement, whereas Convolutional Neural Networks (CNN) and Long Short-Term Memory (LSTM) architectures are leveraged for advanced representation learning and sequential intrusion identification. Network traffic obtained from publicly available benchmark datasets, such as NSL-KDD and CICIDS, is used to assess system effectiveness across multiple attack scenarios. The hybrid design strengthens the identification of both known and previously unseen attacks while significantly reducing false alarm rates. Experimental results indicate an accuracy of 97.2%, precision of 97.6%, a detection performance of 96.9%, and a false positive rate of 2.3%. Furthermore, the developed model attains an average detection latency of 2.1 seconds and supports scalable operation under heavy traffic conditions with low computational cost. Overall, this hybrid framework offers a reliable and high-performance solution for real-time network attack detection in dynamic and heterogeneous network environments.

562.IMPROVING SOFTWARE DEFECT PREDICTION USING STACKING AND LIGHTGBM

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Software defect prediction plays a vital role in improving software quality and reducing testing effort by identifying faulty modules at early stages of development. In order to increase accuracy, this work presents an intelligent ensemble-based software defect prediction system with advanced stacking and safe online deployment. The proposed extension integrates a Stacking Classifier composed of Decision Tree, Random Forest, and LightGBM, enabling effective learning from diverse defect patterns and reducing individual model bias. Compared to traditional voting-based ensembles, the stacking approach significantly improves predictive performance and robustness. To ensure practical usability, the model is deployed using a Flask-based web

interface with user authentication, allowing secure and interactive defect analysis. Experimental evaluation on benchmark NASA MDP datasets (CM1, JM1, MC2, MW1, PC1, PC3, and PC4) demonstrates that the extended model achieves superior accuracy, reaching up to 93.5%, outperforming baseline ensemble methods. The results confirm that the proposed improvement, real-world software fault prediction is secure, accurate, and scalable.

563.BLOCKCHAIN-DRIVEN PUBLIC TENDER ALLOCATION: A TRUST-CENTRIC APPROACH

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The high rate of rise in demand of public infrastructure necessitates the necessity of a clear, secure and transparent platform through which there can be effective interaction of the citizens, the government authorities and the contractors. Traditional public grievance and tender management processes are usually affected by inefficiencies such as lack of transparency, sluggish verification process, bid rigging, false billing, and no long-term responsibility of the contractor. The project enables the general users to communicate the infrastructure related problems like road damages, failing drainage and/or building defects using a centralized web interface. Issues submitted are put through a multi-level verification by the government authorities in order to verify their authenticity before being translated into official tenders. The registered and verified contractors are offered a secure bidding system with the bid information being stored forever on the Ethereum blockchain with the help of MetaMask and ensuring its safe storage in a centralized database to keep the system efficient. The logic of the smart contract ensures fair allocation of tenders whereby the lowest valid bidder is selected and the contract is reassigned to the next valid bidder in the event of the failure of the contractor. Its system provides real-time email notifications, role-based access control and the continuous monitoring of the progress of work with daily updates containing geo-tagged evidence. Fraud detection mechanism authenticates the bills that are submitted by comparing approved budgets, work completion measure and previous contractor behavior. There is also a performance evaluation system based on warranty that follows through acquired infrastructure over a specified time meaning that contractors will be punished in the event of premature failures and failure of reliable parties to engage in subsequent tenders. This system proposes to improve trust, accountability, and efficiency in the development of the public infrastructure by combining blockchain transparency, automated monitoring, scoring of contractors by its reputation, and administrative oversight.

564.MULTI MODEL APPROACH FOR PHISHING WEBSITE DETECTION USING ML AND DL TECHNIQUES

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In the technology era, Phishing has continued to be a great challenge within the cybersecurity and web security landscape. This involves exploiting human trust on any online services and subtle technical flaws. This is to gather credentials, financial data, and sensitive information across diverse online platforms and various users. Traditional defenses like static blacklists, signature-based filters and simple detection rules are limited by slow update cycles and an inability to capture subtle syntactic and behavioral cues. To address these shortcomings, we propose a hybrid detection framework that fuses classical supervised machine-learning classifiers (e.g., Logistic Regression, SVM, Random Forest) with sequence-aware deep learning (LSTM) to jointly model lexical, structural, syntactic, and behavioral features extracted from URLs and webpage metadata. This combined approach leverages the interpretability and stability of ML models alongside the pattern-learning strength of LSTMs to detect both known and zero-day phishing attempts, produce calibrated confidence scores and deliver comprehensive reports via a real-time web interface resulting in a robust, transparent, and operationally useful solution for strengthening web security.

565.MEDLINK: A UNIFIED DIGITAL HEALTH KIOSK FOR INTEGRATED MONITORING AND TELECONSULTATION

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Digital healthcare platforms are often fragmented and features like vital monitoring, medical record management, teleconsultation and symptom checkers exist in isolated systems [1]. Existing systems largely focus on telemedicine or appointment booking and lack features such as vital analysis and simple interpretation of medical records such as blood reports which can be difficult for a patient to understand. This paper proposes the MedLink Health Kiosk System, a cloud-based platform [3] which integrates features like rule-based diagnosis assistance, medical record management and teleconsultation within a single unified platform. MedLink allows a user to record their vitals such as blood pressure, heart rate, body temperature, oxygen level, sugar level, height and weight [4], [6]. These vitals are analysed using date-wise graphs which give a visual representation to the patient [6]. A rule-based symptom checker [1], [19] maps user selected symptoms to probable conditions and provides simple harmless medication suggestions for early self-assessment. Patient can upload their previous medical prescriptions and can also get simplified human-readable explanations of his blood reports using large language model-based summarization [13]. MedLink further provides real-time appointment scheduling, secure online payments and video-based teleconsultations [2], [10]. Doctors can access patients' previous medical records using OTP thereby maintaining authorised access to personal information [15]. The system brings together rule-based decision support, medical report interpretation, secure access mechanisms, and real-time teleconsultation, demonstrating its effectiveness as an integrated and patient-centric digital healthcare platform.

566.EMOTION DETECTION IN REAL TIME USING FACIAL EXPRESSIONS

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Real-time analysis of facial expressions is an essential component in modern applications such as virtual learning environments, mental well-being assessment, and adaptive human-computer interaction. This paper introduces a real-time facial emotion detection framework that integrates computer vision techniques with deep learning models. Live facial data are acquired through a webcam and processed to extract relevant facial features for emotion analysis. A convolutional neural network (CNN) is utilized to classify facial expressions into multiple emotional categories, including happiness, sadness, anger, surprise, fear, and neutrality.

The emotion classification model is trained on a balanced facial expression dataset to enhance prediction accuracy and generalization across individuals with diverse facial characteristics. The system visually displays the recognized emotions by overlaying labels on the live video stream, enabling instant user feedback. Designed with computational efficiency in mind, the proposed approach functions effectively on conventional hardware platforms without requiring high-end processing resources. The experimental evaluation confirms that the

system provides accurate and responsive emotion recognition, making it suitable for real-world interactive applications.

567.MACHINE UNLEARNING TOWARDS ETHICAL FORGETTING WITH MINIMAL PERFORMANCE LOSS

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We address the problem of machine unlearning, where the goal is to remove the influence of specific training data from a model upon request, motivated by privacy concerns and regulatory requirements such as the “right to be forgotten.” Unfortunately, existing methods rely on restrictive assumptions or lack formal guarantees. To this end, we propose a novel method for certified machine unlearning, leveraging the connection between unlearning and privacy amplification by stochastic post-processing. Our method uses noisy fine-tuning on the retain data, i.e., data that does not need to be removed, to ensure provable unlearning guarantees. This approach requires no assumptions about the underlying loss function, making it broadly applicable across diverse settings. We analyze the theoretical trade-offs in efficiency and accuracy and demonstrate empirically that our method not only achieves formal unlearning guarantees but also performs effectively in practice, outperforming existing baselines

568.AUGMENTED REALITY INTEGRATED WITH EMBEDDED SYSTEMS FOR INDUSTRIAL TRAINING

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For maintaining operational protocols and safety, it is important that industrial training follows a set of strict operational procedures. Conventional methods such as manuals and videos are considered passive as they do not verify the performance of tasks by the students. These methods are generally devoid of proper guidance that can help the students learn how to perform tasks correctly. Even augmented reality (AR) can help the students gain better clarity regarding how to perform tasks. However, it has been found that most AR-based training methods

currently available do not verify the actions performed by the students. The research proposed here includes an AR-based framework that can be integrated with virtual instructions. The framework ensures that each step of the training is verified before moving on to the next step. Such a framework can help avoid any errors or skipping of steps. The framework has been found effective through experimental evaluation carried out under a controlled environment. The proposed framework can be used as a cost-effective model for implementing industry 4.0.

569.AUTOMATED FILE PROCESSING IN AWS CLOUD USING SERVERLESS ARCHITECTURE

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Cloud computing has become an essential platform for managing large-scale data and applications in modern enterprises. However, manual processing and management of files in cloud environments remain time-consuming, error-prone, and inefficient. To address these challenges, this research proposes an automated file processing system using Amazon Web Services (AWS) based on serverless architecture. The proposed system utilizes AWS services such as Amazon S3 and AWS Lambda to enable event-driven automation for file handling, conversion, and processing without the need for dedicated servers. Whenever a file is uploaded to an S3 bucket, the system automatically triggers a Lambda function to perform predefined operations such as format conversion, data extraction, or transformation. The architecture eliminates manual intervention, reduces operational overhead, and improves processing efficiency. The system is designed to be scalable, cost-effective, and secure through the use of IAM roles and AWS monitoring services. Experimental results demonstrate that the proposed solution significantly reduces execution time and resource usage compared to traditional manual processing methods. The research highlights the effectiveness of serverless computing in building intelligent and automated cloud-based applications and provides a practical framework for real-world file processing automation in AWS environments.

570.AN EXTENDED VIRTUAL REALITY–BASED MOCK INTERVIEW SIMULATOR WITH AUTOMATED NLP-DRIVEN PERFORMANCE EVALUATION

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Within current recruitment ecosystems, interview performance has become a decisive indicator of candidate suitability, where assessment extends beyond technical expertise to encompass verbal articulation, behavioral coherence, and confidence demonstration. Although many graduates exhibit adequate academic preparedness, they frequently experience sub-optimal interview outcomes due to heightened anxiety, minimal interaction with realistic interview environments, and the lack of standardized, objective feedback frameworks. Conventional mock interview practices remain predominantly human-driven, resulting in subjective evaluations, low consistency across sessions, and limited capacity for large-scale deployment.

This study presents a Virtual Reality (VR)–enabled mock interview architecture integrated with automated performance assessment leveraging speech analytics and Natural Language Processing (NLP) methodologies. The system constructs immersive interview scenarios through interactive virtual settings and intelligent

interviewer avatars, while systematically examining candidate responses using semantic alignment measures, speech fluency indicators, confidence inference models, and structured behavioral analysis. Empirical observations from iterative usage reveal enhanced confidence levels, reduced response latency, and measurable improvements in interview performance over successive sessions. The proposed framework serves as a scalable, impartial, and deployment-ready solution for structured employ- ability skill development in academic and training institutions.

571.STROKE PREDICTION USING MACHINE LEARNING

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Stroke is a major cause of mortality and long-term disability across the globe, demanding early and accurate risk prediction to enable timely medical intervention. Conventional clinical assessment methods are often subjective and limited in handling large-scale heterogeneous healthcare data. This paper proposes a machine learning-based framework for stroke prediction using patient clinical attributes such as age, hypertension, heart disease, glucose level, body mass index, and lifestyle factors. The system employs data preprocessing, feature engineering, and class imbalance handling techniques to improve prediction reliability. Multiple machine learning models including Logistic Regression, Random Forest, Support Vector Machine, and Gradient Boosting are evaluated. Experimental results demonstrate that ensemble and tree-based models achieve superior recall and ROC-AUC, making the proposed system suitable for clinical decision support applications.

572.EXPERIMENTAL STUDY ON CO-PYROLYSIS OF WASTE POLYTHENE COVERS AND BAGASSE FOR SUSTAINABLE FUEL PRODUCTION

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The accumulation of single-use plastic waste is a growing global issue, with traditional disposal methods, such as incineration and landfilling, causing environmental harm. In response, energy recovery technologies, such as plastic pyrolysis particularly the co-pyrolysis of plastic and biomass have gained attention as more sustainable alternatives. This study explores the co-pyrolysis of waste polythene covers and bagasse, examining the impact of the bagasse-to-plastic (B/P) ratio on oil and gas yields. A synergistic effect was observed during co-pyrolysis, leading to improved product yields and enhanced quality of oil compared to individual pyrolysis of plastic or biomass alone. The produced oil exhibited diesel-like properties, including favourable viscosity and calorific value. Thermodynamic simulations on a compression ignition engine revealed that Co-pyrolysis oil (CPO) improved brake power (14.4%), reduced specific fuel consumption (7.4%), and lowered CO₂ (10.2%), PM (19.9%), and smoke (6.3%) emissions compared to diesel. However, NO_x emissions increased, highlighting trade-offs between performance and emissions.

573.MACHINE LEARNING–BASED PREDICTIVE CO2 EMISSION MONITORING FOR SUSTAINABLE COAL MINE OPERATIONS

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Coal mining is an important source of energy, but it also produces a large amount of carbon dioxide (CO₂), which can be dangerous in underground mine areas. High levels of CO₂ not only affect the environment but also create serious safety risks for workers. In many coal mines, gas monitoring systems are used only to measure current values and do not help in predicting future conditions. Because of this, sudden increases in CO₂ levels may not be identified early enough to prevent accidents. In this project, a system is developed to monitor and predict CO₂ levels in coal mines using machine learning. Sensors placed inside the mine continuously collect CO₂ data, which is then sent to a cloud server for storage and analysis. A Random Forest regression model is used to study past and current data patterns and estimate future CO₂ concentrations. If the predicted CO₂ level goes beyond the safe limit, the system provides an alert so that necessary actions, such as improving ventilation, can be taken in advance. The proposed model is tested using collected sensor data and compared with other machine learning methods. The results show that the Random Forest model gives better prediction accuracy with lower error values. This system helps in improving worker safety and supports better decision-making in coal mine operations by providing early warnings instead of only real-time measurements.

574.DIGICRED: DECENTRALIZED IDENTITY AND CREDENTIAL SYSTEM FOR D-APPS

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Digital credential verification plays a critical role in academic and professional ecosystems. Traditional credential management systems rely on centralized databases and manual verification processes which introduce delays security risks and trust issues. This paper presents DigiCred, a blockchain based decentralized identity and credential management system designed to enable secure tamper proof and transparent verification of academic and professional credentials. The proposed system allows issuers holders and verifiers to interact without relying on centralized authorities. Smart contracts are used to store credential hashes and reputation scores on the blockchain ensuring immutability and authenticity. Real time verification enables instant validation of credentials while preventing forgery and unauthorized modification. The system promotes trust transparency and self sovereign identity making it suitable for modern digital ecosystems.

575.FACIAL EMOTION RECOGNITION FOR AUTISTIC PEOPLE

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Autism Spectrum Disorder (ASD) is a complex neurodevelopmental condition characterized by deficits in social interaction, communication, and emotion recognition. Recent advances in Artificial Intelligence (AI) and Deep Learning (DL) have enabled the development of innovative diagnostic and intervention frameworks that address these challenges through multimodal analysis, emotion recognition, and behavioral assessment. This review presents a comprehensive synthesis of current AI-based approaches for emotion detection, behavioral monitoring, and early diagnosis of ASD. The first category of studies focuses on personalized multimodal neural frameworks such as m_AutNet, which combine facial and vocal modalities to achieve domain-invariant emotion recognition with improved accuracy for autistic children. Another research direction emphasizes compound emotion recognition (CER) using spatio-temporal geometric features and Recurrent Neural Networks (RNNs) to detect complex emotional states during meltdown crises. Parallelly, functional connectivity-based models like Brain-Shapelet leverage fMRI data to capture instantaneous brain activity abnormalities, offering valuable biomarkers for ASD diagnosis. Speech-based deep learning approaches further explore prosodic and acoustic features to estimate ASD severity, demonstrating the predictive potential of CNN and DNN architectures. Additionally, robot-assisted emotion recognition systems such as those employing NAO and ZECA robots highlight the therapeutic and interactive potential of AI in emotion-related interventions. Complementary advances in computer vision and facial expression recognition using divide-and-conquer strategies and video-based motion analysis contribute to more accurate and explainable ASD detection frameworks. Collectively, the reviewed literature underscores the growing synergy between neuroscience, affective computing, and AI, while identifying persistent challenges such as dataset scarcity, individual variability, multimodal fusion complexity, and the ethical considerations of AI-based ASD interventions. This review concludes by outlining emerging directions toward more personalized, interpretable, and secure AI systems for supporting early diagnosis and emotional well-being of individuals with ASD.

576.A FEDERATED LEARNING FRAMEWORK WITH PROXIMAL REGULARIZATION USING LSTM NETWORKS

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Federated Learning (FL) enables collaborative model training while preserving data privacy; however, its performance degrades significantly under non-independent and identically distributed (non-IID) data, which is common in real-world applications. This issue becomes more pronounced when training sequential models such as Long Short-Term Memory (LSTM) networks, where the standard Federated Averaging (FedAvg) algorithm struggles to achieve stable convergence and high accuracy due to client heterogeneity. To address this limitation, this paper proposes an LSTM-based federated learning framework enhanced with the FedProx optimization strategy. FedProx introduces a proximal term that constrains local model updates, effectively reducing client drift caused by non-IID data distributions. By integrating FedProx with LSTM, the proposed approach stabilizes local training while preserving temporal feature learning. Experimental results demonstrate that the proposed LSTM + FedProx model achieves faster convergence, improved training stability, and higher prediction accuracy compared to traditional FedAvg-based LSTM models. These improvements highlight the effectiveness of the proposed method in handling heterogeneous data environments, making it suitable for practical federated learning applications involving sequential and time-series data.

577.ENHANCED ERYTHEMATO-SQUAMOUS DISEASE CLASSIFICATION USING FEATURE SELECTION AND MACHINE LEARNING MODELS

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Erythematous-squamous diseases (ESD) represent a group of dermatological conditions that significantly impact patients' well-being and require accurate diagnostic methods for effective management. In this study, a publicly available clinical dataset containing multiple dermatological attributes was utilized to develop a reliable machine learning-based diagnostic framework. The data was carefully curated to reduce bias and enhance model reliability. Principal component analysis and various machine-learning algorithms were applied to identify the most influential clinical features for distinguishing between the major ESD categories. A wide range of machine learning models from different families were trained and evaluated to determine the most suitable classification approach. The analysis revealed that only a subset of clinical predictors was essential for effective classification, highlighting the importance of feature selection in improving diagnostic performance. The

findings demonstrate that machine learning, combined with optimized feature selection, can support more efficient and interpretable diagnosis of erythemato-squamous diseases.

578.AI BASED HEART DISEASE DIAGNOSIS SYSTEM USING RANDOM FOREST ALGORITHM

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Cardiovascular diseases remain one of the leading causes of mortality worldwide, necessitating accurate and early diagnostic systems to assist clinical decision-making. Traditional heart disease detection methods rely heavily on manual examination of echocardiogram images, electrocardiogram (ECG) signals, and clinical attributes, which are often time-consuming, error-prone, and dependent on physician expertise. To address these limitations, this paper presents an intelligent artificial intelligence-driven heart disease diagnosis framework designed for automated classification and severity-level prediction using machine learning techniques. The proposed system employs a Random Forest-based ensemble classifier for robust and reliable prediction, combined with comprehensive feature preprocessing, normalization, and probability-based risk estimation to enhance diagnostic accuracy. The framework integrates data acquisition, preprocessing, model training, prediction, and real-time web deployment using Python, Flask, Scikit-learn, and SQLite for efficient patient data management. Experimental evaluation conducted on standard heart disease datasets demonstrates superior performance compared to conventional classifiers, achieving an overall accuracy of 97.8%, precision of 96.9%, recall of 97.2%, and low prediction latency suitable for real-time clinical usage. The system further provides detailed severity categorization and probability scores, enabling interpretable and actionable medical insights. The results confirm that the proposed approach offers a computationally efficient, scalable, and reliable solution for early-stage heart disease detection and clinical support.

579.INTELLIGENT WEARABLE FOOTWEAR FOR FALL AND POWER GENERATION

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Falls among elderly people are a major health concern and often lead to severe injuries if not attended to immediately. At the same time, wearable electronic devices face power limitations due to frequent battery charging. This project proposes an Intelligent Footwear System that integrates fall detection and self-power generation using piezoelectric energy harvesting. The footwear is embedded with force sensors and a piezoelectric plate to detect abnormal pressure patterns and generate electrical energy during walking. An ESP8266 microcontroller processes the sensor data and sends alerts through an IoT platform when a fall is detected. The generated energy is stored in a rechargeable battery to support system operation. The proposed system enhances elderly safety, reduces dependency on external power sources, and provides a low-cost, reliable smart healthcare solution.

580.BLOCKCHAIN-BASED ONLINE VOTING SYSTEM

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The Voting DApp is a decentralized application that aims at providing a secure, open, and tamper-proof system for conducting elections on any blockchain platform. The Smart contract functionality on the Ethereum blockchain delivers basic functionality for the management of votes, ensuring integrity in voting using a secure registration system, role-based access control, and a mechanism to prevent multiple votes by users. Election voting can now be carried out through a user interface designed in React with Web3 integration for registered voters, and administrators can manage candidates and voter registration for an election. Voting DApp offers a very nice solution to modern electronic voting platforms where trust in elections is going to be ensured-a solution leveraging blockchain for immutability, real-time feedback.

581.CRAMPAL: A SMART WEARABLE FOR ADAPTIVE RELIEF FROM CYCLICAL DISCOMFORT

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In order to provide adaptive alleviation from recurrent stomach pain, such as menstrual cramps, this study presents a prototype for a smart wearable device. The device provides individualized comfort without requiring user input by combining condition-based actuation with physiological sensors. While a Dallas temperature sensor continually monitors skin temperature, a force sensor is used to detect variations in abdominal pressure. After processing the input from these sensors, an ESP32 microprocessor modifies the actuation mechanisms. A heating pad is turned on to offer warmth if a low temperature is detected, and a vibration motor is turned on to relieve discomfort when pressure levels rise. A relay-based unit controls the actuation to guarantee precise and secure functioning. A small OLED panel displays real-time sensor data and system status, giving the user immediate feedback. With an emphasis on user comfort and portability, the complete system is combined into a wearable belly belt. The device demonstrates the promise of sensor-driven adaptive relief mechanisms for successfully treating cyclical discomfort, while being a prototype and not meant for clinical application.

582.SMART ASTHMA RISK PREDICTION SYSTEM USING IOT AND MACHINE LEARNING

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Asthma is a chronic respiratory disease whose severity is strongly influenced by environmental factors such as air pollution, particulate matter, temperature, and humidity. Continuous monitoring and early prediction of asthma risk are therefore critical for preventive healthcare. This paper presents an IoT-based asthma risk prediction system that integrates real-time environmental sensing with a Machine Learning-based predictive model. The proposed system employs an ESP32 microcontroller interfaced with gas sensors, a PM2.5 sensor, and a temperature-humidity sensor to collect environmental data continuously. Sensor readings are transmitted to the Blynk IoT cloud platform, enabling real-time visualization and smartphone-based monitoring. An LSTM-based Machine Learning model is used to analyze both real-time and historical sensor data by learning temporal dependencies among environmental parameters to predict asthma risk conditions. Experimental evaluation shows that under high pollution scenarios, characterized by elevated PM2.5 and toxic gas levels, the system correctly identifies unsafe air quality and generates an asthma alert, as indicated by the prediction output “Asthma Alert: YES” and “Good Air Quality: NO.” Conversely, under clean air conditions, the system classifies the environment as safe with no asthma warning. The results demonstrate that the proposed IoT–Machine Learning framework can effectively distinguish between safe and hazardous environmental conditions and provide timely alerts through both local displays and mobile applications. The system offers a low-cost, scalable, and intelligent solution for real-time asthma risk prediction and environmental health monitoring.

583.INTELLIGENT INDUSTRIAL MONITORING SYSTEM FOR INDUCTION MOTOR FAULT DETECTION USING HYBRID CNN-GRU MODEL

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Induction motors are very important in the functioning of machinery in the contemporary industrial environment to ensure continuity and efficiency in the running of industrial machinery. Nonetheless, in the case of such unforeseeable failures in the motor, causing considerable loss in production, the traditional fault diagnosis techniques involving hand-inspection and set rules fail to identify the faulty setups in the conditions of different operation. To solve this problem, a hybrid CNN-GRU deep learning model is designed and used to deploy an intelligent industrial monitoring system to detect faults in the induction motor. The proposed work detects bearing, rotor and stator fault detection by using vibration, stator current and voltage signals measured by the system as inputs. GRU is used to acquire the temporal behavior of the sensor signals, and CNN is utilized to extract useful features out of the sensor signals. Learning rate and batch size and the number of hidden units are some of the optimized hyperparameters by the particle swarm optimization (PSO) to improve the model performance. Accuracy, precision, recall and F1-score are the measures taken whose results are 98.67%, 99.32%, 97.90% and 98.48% respectively. The findings reveal a higher fault detection ability than the conventional methodologies such as shedding light on the appropriateness of the proposed system in the predictive maintenance in the industrial settings.

584.AI-POWERED SMART DEVICE FOR DETECTING SPEECH STAMMERING USING NEURAL NETWORKS

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This paper explains the design of a small AI-based smart device which can recognize stammering in real-time using neural network algorithms runnable on embedded hardware. The primary objective is to offer individuals, clinicians, and caregivers a low-cost and objective option of monitoring. The system uses HC-05 Bluetooth module to communicate locally, a NodeMCU (ESP8266) to connect with a cloud to log the data collected by the IoT, and a cheap microcontroller like the Arduino UNO to process the initial signals.

The use of a better neural network model (TensorFlow Lite) guarantees high classification accuracy (85-90% were demonstrated) and the applicability to different speech patterns. This technology helps to overcome the limitations of the existing traditional methods whereby the assessment of stammering is subjective, as well as a rare clinical event that cannot be repeated, and thus would remain an unstructured, data-driven monitoring process

585.SMART CROP PREDICTION USING SOIL MOISTURE BY MACHINE LEARNING

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Modernizing agricultural forecasting requires a transition from longitudinal data analysis to the integration of high-frequency, real-time telemetry. Since crop viability is fundamentally governed by the interplay between pedological and atmospheric variables, a real-time framework facilitates the delivery of precise, site-specific cultivar recommendations. In many regions, the persistence of conventional agricultural heuristics—often detached from empirical data—results in sub-optimal yield densities and resource-use inefficiencies. This study introduces an intelligent predictive architecture designed to optimize crop selection by synthesizing soil nutrient profiles with dynamic environmental catalysts. The methodology incorporates a multi-dimensional feature set, including macronutrient concentrations, pH levels, thermal fluctuations, and hydrometeorological patterns. To identify the most robust predictive engine, we evaluated several classification frameworks across a suite of statistical fidelity indicators. Experimental results indicate that meta-classifier configurations (ensemble models) provide the highest predictive stability and classification success. The resulting framework provides a rigorous foundation for data-driven decision-making, mitigating the risk of productivity deficits while fostering sustainable and resource-efficient agricultural operations. Furthermore, the scalability of this predictive architecture offers a viable pathway for integrating automated decision support into existing smart-farming infrastructures to facilitate long-term climate resilience. By streamlining the transition from raw environmental telemetry to actionable insights, the system effectively bridges the technical gap between laboratory-based modeling and practical, field-scale application. Ultimately, this research establishes a standardized benchmark for future developments in real-time agricultural analytics, prioritizing both computational efficiency and environmental stewardship.

586.REAL-TIME TEMPERATURE PREDICTION OF PMSM MOTOR USING MACHINE LEARNING

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Electric machines, integral to renewable energy and transportation sectors, face efficiency challenges due to thermal constraints. Traditional methods for temperature monitoring, such as Computational Fluid Dynamics (CFD) and finite element analysis, are accurate but computationally intensive, limiting their application in real-time scenarios. Alternative data-driven approaches have emerged but lack incorporation of key physical

insights, such as power loss estimations. This study integrates power loss estimations into supervised machine learning models, specifically Linear Regression and Random Forest. Using extensive empirical data, the models are trained with features derived from physical parameters, such as effective voltage and current, to improve prediction accuracy. The models are evaluated using k-fold cross-validation and optimized using Bayesian hyperparameter tuning for enhanced performance. The Random Forest model outperformed others, achieving a mean absolute error (MAE) of 1.50°C and a root mean squared error (RMSE) of 2.20°C, with an R^2 of 0.93. These results demonstrate significant improvement in accuracy and computational efficiency compared to traditional and other machine learning methods. Incorporating physical insights, such as loss estimations, into machine learning models enables efficient and accurate real-time temperature predictions for electric machines. This approach facilitates better thermal management, allowing for higher power density and improved performance. Future work will explore hybrid models and advanced neural network architectures to further enhance prediction reliability and application scope.

587. AN ENHANCED DEEP LEARNING FRAMEWORK FOR UNDERWATER MARINE DEBRIS DETECTION USING IMAGE ENHANCEMENT AND YOLO ARCHITECTURES

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Accumulation of synthetic waste in marine environments constitutes a growing ecological crisis, demanding automated, real-time monitoring systems capable of functioning under adverse imaging conditions. Conventional detection models are ill-suited for this task due to the unique optical distortions inherent to underwater scenes. This work introduces a hybrid detection pipeline that couples a CNN-driven image enhancement stage with advanced YOLO-series detectors, specifically YOLOv8, YOLOv9, and YOLOv11. Experiments conducted on the TrashCan benchmark dataset confirm that preprocessing consistently boosts detection accuracy across all tested architectures. Notably, YOLOv11 equipped with the enhancement pipeline attains 95.8% mAP@50 at an inference latency below 3ms, validating its suitability for deployment aboard autonomous underwater vehicles (AUVs) in real-world monitoring scenarios.

588. CONTRIBUTION TITLE CARDIOViT: AN EXPLAINABLE SPATIO-TEMPORAL VISION TRANSFORMER FOR CORONARY ARTERY DISEASE ASSESSMENT

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Coronary artery disease (CAD) is a primary cause of death globally, and its timely diagnosis is indispensable for avoiding acute cardiac complications. Coronary angiography (CA) is the medical gold standard for detecting stenosis; however, its manual assessment is subjective, laborious, and vulnerable to inter-observer differences due to contrast fluctuations, dynamic cardiac motion, and overlapping vessel structures. Prevailing deep network approaches exhibit robust attribute capturing abilities but are intrinsically restricted in extracting long-range spatial relationships and temporal flow patterns across frames. To solve these problems, we propose CardioViT, a new explainable spatio-temporal Vision Transformer (ViT) designed for analyzing multi-frame CA sequences. CardioViT employs a dual-stream multi-frame encoder that represents spatial vessel structure and models temporal variations across frames using cross-frame self-attention mechanisms. This structure allows the model

to understand subtle variations in contrast distribution and vessel dynamics. These features serve as essential biomarkers for estimating the severity of stenosis. Also, we include a Spatio-Temporal Score-based Class Activation Mapping (STS-CAM) to produce high-resolution and diagnostically reliable heatmaps that emphasize pathological vessel areas throughout the CA sequence. The inclusion of this explainability mechanism not only increases medical transparency but also helps heart specialists in validating predictions with greater confidence. We assess CardioViT on the Mendeley Data V1 database, which contains several sequence-based datasets characterized for healthy and stenosis conditions. The proposed CardioViT model realizes 98.7% accuracy, 95.8% sensitivity, 99.1% specificity, 96.3% precision, 96.0% recall, 96.1% F1-score, a 2.4% false-positive rate, and a 1.9% false-negative rate. This model considerably improves classification performance related to several advanced neural networks and ViT-based baselines models in terms of accuracy, reliability, and explainability.

589.PROGRAMMED LEARNING FRAMEWORK FOR APPLICANT CREDIT RISK EVALUATION AND LOAN DELINQUENCY PREDICTION

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Effective credit risk evaluation is critical for financial institutions to minimize loan defaults and ensure smooth lending activities. This project proposes a Programmed Learning Framework for Applicant Credit Risk Assessment and Loan Default Prediction using machine learning approaches. This research work offers a predictive model that aims to forecast the likelihood of loan defaults based on a thorough examination of applicant profiles, which include factors such as income levels, credit scores, employment status, and repayment history. The predictive model makes use of past loan data to classify applicants as high-risk and low-risk groups. In terms of methodology, the predictive model combines thorough data processing and feature selection methods with sophisticated classification models, namely Logistic Regression, Random Forest, and Gradient Boosting, to improve the predictive capability of the risk model. The proposed model applies accuracy, precision, recall, and ROC-AUC to measure the performance of the proposed model. The model can be developed as a web application for effective risk assessment in real-time, enabling financial institutions to minimize losses and maximize credit risk management techniques.

590.A COMPUTATIONAL ADAPTIVE PLATFORM FOR PREDICTING EMPLOYEE RESIGNATION AND IMPROVING COGNITIVE WORKFORCE RESOURCES

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In the "Human-Centric" landscape of Industry 5.0, an era of resilience and technology symbiosis, the constituent elements of the organization require the best talent for sustainability by design. Existing HRMs that depend on conventional strategies derived using traditional data and analysis techniques fail to provide an adequate prediction of the extent of employee attrition for the organization's sustainability. This study proposes an ML-powered predictive system that uses the patterns hidden within the data related to the employees to provide an estimated prediction for the extent of attrition occurring within the organization's talent pool. After conducting an assessment of five predictive models using the publicly accessible dataset provided for analysis, the best

model for employee attrition prediction has been identified, namely the "Random Forest Model," which promises the highest degree of precision and robustness for the organization's HRMs to design the best strategies for sustainability across the "human-centric landscape" of Industry 5.0's dynamic landscape.

591.EXPLAINABLE AND INTERPRETABLE SMART SYSTEMS FOR CLINICAL EVALUATION OF TIBIOFEMORAL JOINT OSTEOARTHRITIS

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Unstandardized medical knowledge and subjective analysis have posed challenges to the diagnosis of osteoarthritis in the knee based on radiographic images and relative featured images. Osteoarthritis can now be automatically detected with an accuracy comparable to that of human experts thanks to recent developments in deep learning. The majority of current models are opaque systems, which makes it challenging to apply them in medical settings despite these advancements. Explainable AI has solved this problem, making it possible to understand predictions more clearly. With SHAP pointing to particular feature contributions for a final prediction, Grad-CAM is used to identify important regions within images related to joints. For osteoarthritis screening, the suggested method is effective in determining Kellgren and Lawrence grades, including grade one. Models that are trained on a variety of data sources are more adaptive to a range of demographics. Thus, unalloyed diagnosis is supported by the system. Furthermore, it is a reliable tool for scre.

592.EXPLAINABLE AND INTERPRETABLE SMART SYSTEMS FOR CLINICAL EVALUATION OF METABOLIC SYNDROME

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Metabolic Syndrome diagnosis based on radiographic images has been challenged by subjective analysis and unstandardized medical knowledge. With recent advances in deep learning, it has been possible to detect osteoarthritis automatically with accuracy equal to human experts. Despite such achievements, most existing models are opaque systems, making it difficult for their implementation in medical settings. This challenge has been addressed by Explainable Artificial Intelligence, enabling better comprehension of predictions. Grad-CAM is applied to identify key areas within images related to joints, with SHAP pointing to specific feature contributions for a final prediction. The proposed system is efficient for Kellgren & Lawrence grade determination, including grade one, for screening osteoarthritis. Training models on varied data sources enhances adaptability for diverse populations. The system is thus supportive for unalloyed diagnosis. Additionally, it is a trustworthy tool for screening osteoarthritis conditions for patients.

593.A COGNITIVE OPTICAL ANOMALY RECOGNITION SYSTEM FOR RAILWAY INFRASTRUCTURE INTEGRITY MONITORING

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Technological evolution is observed in railway track inspection methods due to the passage from traditional image processing methods to more innovative data-driven models, owing to the inflexibility of more traditional

methods upon being exposed to real-world scenarios. Though its capability of handling uncertain inputs has been improved with the inclusion of fuzzy-logic principles in it, owing to its reliance on manually coded knowledge, it has become less relevant. The current paper discusses a new complete process for railway track inspection that combines the autonomous identification power of convolutional neural networks and the logical deduction power of fuzzy logic inference. This new process combines the autonomous identification power of CNNs with the logical deduction power of fuzzy logic inference.

594.A CLOUD-BASED AUTOMATED SYSTEM FOR ANALYZING REAL-TIME AIRLINE PRICE TRENDS USING AI-POWERED PREDICTIVE MODELS

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Factors such as passenger demand, seasonal variations, fuel prices, airline pricing strategies, and market dynamics have been observed to affect airline ticket prices. However, traditional airline ticket price prediction models, which rely on statistical analysis or predefined rules, face difficulties in dealing with the non-linear relationships and time dependencies that exist in airline ticket price data. In this context, this paper proposes the design of a cloud-based automated system for predicting airline ticket prices in real-time using advanced machine learning concepts. The system relies on both past and current flight information to identify route-specific patterns, seasonal influences, and time-dependent variations in airline ticket prices. By integrating generative artificial intelligence concepts with Long Short-Term Memory networks, the proposed system is able to handle time dependencies and adapt to changing market conditions. The proposed system is more adaptable and scalable than existing systems and can be easily implemented in today's airline ticket pricing systems.

595.A WEB-BASED THERAPY AUTOMATION SYSTEM FOR PANCHAKARMA

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Panchakarma therapy is a key component of Ayurvedic medicine. All components of the treatment process for Panchakarma therapy must be completed with great care, in accordance with specific guidelines, and by personnel highly trained and equipped to function together closely. Unfortunately, many Ayurvedic hospitals continue to use manual systems (i.e., paper-based documentation and informal communication between staff) to coordinate treatment delivery, which results in issues including conflicts with scheduled treatments, an excessive administrative load on staff, uneven distribution of treatments among patients, and a lack of visibility into how resources are being utilized. This paper discusses a web-based Panchakarma Therapy Automation System (PTAS) that utilizes large language models to transform traditional Panchakarma treatment protocols into standardized electronic workflows. The hospitals provide electronic versions of structured treatment descriptions for all the treatments they offer, and a large language model converts those into an electronic format that can be read by computer programs and into semantic embeddings that may complement the treatment. This electronic document will facilitate the selection of appropriate therapy as well as the verification of therapy availability, and the resolution of scheduling conflicts, all in real-time. Once a decision has been made regarding which treatment option to proceed with, the system provides a comprehensive treatment plan that identifies a schedule for each therapy session as well as safety guidelines and materials required for the session and who

will be doing the therapy. To do this the PTAS uses two core algorithms. The first algorithm handles all document ingestion including large document processing such as natural language processing of the document. The second algorithm handles the scheduling of therapy sessions/days using a hybrid combination of rule-based, genetic algorithm, particle swarm optimization, and priority-based heuristics. The scheduling system was created to allow for multi-day/multi-session treatment while considering the physical constraints of the therapist, the room, and materials associated with accomplishing the treatment. Additional enhancements made to the system included the capability to reschedule treatments, cancel sessions and accommodate urgent priority cases. Results from the evaluation of PTAS showed that PTAS was able to significantly reduce the administrative burden related to scheduling, improve the accuracy of when appointments were scheduled, utilize existing resources more efficiently, and overall increase the consistency of treatment provided. These findings provide evidence that there is significant potential for a hybrid optimization technique to improve traditional healthcare organisations' operational efficiency without impeding clinical judgment; this agrees with previous studies about using language models as part of the scheduling process.

596.DEEP LEARNING APPLICATIONS IN DIAGNOSIS OF CONSTIPATION AND GASTROINTESTINAL DISEASES

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Chronic constipation is a significant gastrointestinal disorder. if it left untreated for a longer time can lead to severe complications. While traditional diagnosis relies on subjective clinical judgment, Deep Learning (DL) offers an objective alternative through medical imaging and physiological data analysis. This paper provides a comprehensive review of recent advancements in DL models, including CNNs and RNNs, for constipation diagnosis. We systematically categorize existing literature into clinical studies, imaging applications, and wearable technologies. Our analysis identifies critical research gaps such as data scarcity and the need for multimodal AI frameworks. Finally, this work outlines future directions for standardizing AI-driven diagnostic tools in clinical settings.

597.INNOVATIVE UNDERWATER COMMUNICATION SOLUTION FOR SCUBA DIVERS USING WATER DATA NETWORK

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Diving under water is a very dangerous health-wise activity due to such complications as decompression sickness, hypothermia, and acute cardiovascular or respiratory problems which should be addressed immediately. The traditional methods of monitoring diver health are manual and periodic checks which do not suffice in a situation where there is need to detect emergencies in time. In order to defeat these constraints, this project suggests developing a real-time underwater diver health monitoring device that constantly measure important physiological parameters. The suggested system incorporates wearable biosensors in order to quantify

the heart rate, respiratory rate, blood oxygen saturation (SpO₂), and body temperature. An embedded controller processes the collected data and transmits it to a surface base station through water compatible communications (e.g. acoustic or optical signalling). The wearable device will be made lightweight, waterproof, and can be used in harsh conditions of the sea with a lot of underwater activity. The information on the received health data is observed at the surface station in real time in order to detect any abnormal conditions and provide fast response in case of an emergency. The proposed system will make the diving procedure substantially safer and the emergency reaction in the environment of underwater activities much better by providing constant health check an ensuring the underwater communication efficacy.

598. DESIGN OF A LOW POWER 32 BIT MIPS PIPELINE ARCHITECTURE

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This paper details the design and power, conscious execution of a 32, bit MIPS RISC processor built on a five, stage pipelined architecture and described in Verilog HDL. The processor is designed at the register, transfer level (RTL) and synthesized with the AMD Vivado Design Suite for an Artix 7 FPGA device. The developed architecture combines an integer Arithmetic Logic Unit (ALU) with a separate Floating Point Unit (FPU) that provides floating, point addition, subtraction, and multiplication operations to increase computational flexibility yet keeping the architecture straightforward. Energy efficiency is enhanced by the addition of clock gating techniques at a few selected stages in the pipeline and at functional units to limit undesired switching activity and thus, reducing dynamic power consumption. The processor design is functionally verified via simulation, and timing performance metrics are obtained after synthesis and implementation. Power analysis is conducted with the input of the post, implementation activity estimation using the Vivado Power Analyzer tool. The proposed design offers a scalable and energy, efficient processor architecture that can be used in embedded and low, power running computing applications based on FPGA.

599.CARDIOVASCULAR DISEASE RISK PREDICTION FRAMEWORK USING SHAP AND LIME WITH EXPLANATION CONSISTENCY AND SUBGROUP ANALYSIS

600.REAL TIME WIRELESS UNDERGROUND SENSOR NETWORK FOR EMERGENCY COMMUNICATION IN HILLY AND FOREST REGIONS USING LORA AND MAGNETIC INDUCTION TECHNIQUES

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Wireless Underground Sensor Networks (WUSNs) have emerged as a promising solution for reliable communication in environments where conventional wireless systems fail due to severe signal attenuation and infrastructure constraints. This paper presents a real-time emergency communication system for hilly, forest, and underground regions using soil as a communication medium, combined with Magnetic Induction (MI) and LoRa-based long-range transmission. The proposed system is designed to support trapped workers during disasters such as tunnel collapses and mining accidents by enabling continuous transmission of biomedical parameters, including heart rate, body temperature, and respiratory activity. Underground sensor nodes communicate through soil using MI-based propagation, while LoRa technology is employed at the surface level to relay collected data over long distances to monitoring stations. This hybrid architecture overcomes the limitations of electromagnetic wave propagation in soil and eliminates dependency on line-of-sight communication. Experimental analysis demonstrates that the proposed system ensures reliable data delivery with low power consumption, making it suitable for emergency response scenarios in remote and harsh environments.

601. A HYBRID QUANTUM CLASSICAL INTRUSION DETECTION FRAMEWORK FOR INTELLIGENT SQL INJECTION ATTACK DETECTION

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SQL injection (SQLi) attacks have been one of the most prevalent and harmful attacks on web applications and in most cases allow unauthorized access and manipulation of data. Conventional intrusion detection systems have to rely on classical machine learning algorithms and this might not be able to detect subtle and changing attack patterns in high dimensional SQL query data. In this paper, the author introduces CryptoNet, a quantum-classical based active SQL injection attention framework that uses natural language processing (NLP) with quantum machine learning. Term Frequency - Inverse Document Frequency (TF-IDF) is used to convert SQL queries into numerical feature vectors which are then reduced in dimension using Principal Component Analysis (PCA) to create small quantum-compatible representations. Classical classifiers, including Random Forest and XGBoost are used to analyze them and compared against a Variational Quantum Classifier (VQC) using ZZ Feature Map encoding and a Real Amplitudes ansatz optimized using COBYLA. The results of the experiments indicate that the quantum-enhanced model has a greater accuracy and robustness in the detection of the SQLi patterns in the experimental condition than classical baselines especially the detection of the more complicated or obfuscated SQLi pattern. The suggested framework can be implemented on Noisy Intermediate-Scale Quantum (NISQ) and can provide an API interface that can be used in practice. The paper presents a new unification of quantum feature encoding and NLP-based SQL analysis, which offers a scalable and adaptable method to the contemporary intrusion detection.

602. BART-BASED DOCUMENT SUMMARIZATION USING TRANSFORMER ARCHITECTURE

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The rapid growth of digital documents across academic, legal, healthcare, and enterprise environments has created a significant demand for automated document summarization systems. Manual reading and analysis of long documents is time-consuming and inefficient, particularly when large volumes of text must be processed within limited time frames. Traditional document summarization approaches rely primarily on extractive techniques, which select sentences directly from the source text and often fail to preserve semantic meaning and contextual coherence. This paper proposes a transformer-based document summarization system using the Bidirectional and Auto-Regressive Transformer (BART) architecture. The proposed system processes input documents through text preprocessing and tokenization, followed by abstractive summary generation using a fine-tuned BART model. The generated summaries retain essential information while maintaining readability and coherence. Experimental results show that the system produces high-quality summaries that closely resemble human-written content, making it suitable for real-world document analysis applications.

603. MULTI-SOURCE CROP YIELD FORECASTING USING ENSEMBLE LEARNING AND CNN-BASED DISEASE DETECTION

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Reliable crop yield estimation is essential for improving food security and supporting sustainable agricultural planning. Crop productivity is influenced by a combination of climatic variability, vegetation dynamics, and disease incidence, resulting in complex patterns that are difficult to model using traditional approaches. This study presents a hybrid framework that combines ensemble learning with deep learning to address both yield forecasting and crop disease detection within a unified system. Historical climatic variables, including rainfall, temperature, humidity, and precipitation, are integrated with NDVI time-series data to capture crop growth behavior. Statistical and machine learning models such as ARIMA, SARIMAX, Random Forest, and seasonal-trend decomposition are combined through a stacking-based ensemble strategy to improve predictive reliability. In parallel, a Convolutional Neural Network (CNN) is employed to classify crop diseases from image data and evaluate their potential impact on yield outcomes. Experimental results on regional agricultural datasets indicate that the integrated ensemble approach achieves improved performance compared to individual models. The framework offers a scalable and software-driven solution for precision agriculture without dependence on IoT-based infrastructure.

**604.DEFENDING AGAINST DECEPTION: AI
APPROACH FOR DEEPFAKE DETECTION
IN CYBERSECURITY**

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Highly-realistic deepfake videos, images, and audio are becoming an enormous threat in today's digital world. These are produced with the aid of advanced techniques such as Artificial Intelligence (AI), Machine Learning (ML), and Deep Learning (DL), creating them so convincingly authentic. Deepfakes can be used for false content dissemination, identity fraud, and even financial manipulation. Deepfakes can also be used for influencing public opinions, election manipulation, as well as national security threats. The threat of deepfakes is serious, and in order to counter it, efficient detection methods have to be developed. Researchers are developing innovative detection methods, including AI-based algorithmic applications, forensic authentication, and anomaly detection. Our project will aim to develop efficient deepfake detection methods with added accuracy and enhanced cybersecurity measures. AI-based methods like content authentication systems will be utilized for identifying fraudulent content. Our work focuses on the necessity of continuous innovation in the deepfake detection systems and models for keeping in step with malicious users. With protection of digital communication as well as ensuring purity of online content, the threat of deepfakes can be countered. Concurrently, our work will also take into account applications of deepfake detection in business, healthcare, as well as in educational areas for inhibiting deepfake malpractice.

605.SWASTHYA SAHAYAK: AN AI-DRIVEN MULTILINGUAL PUBLIC HEALTH CHATBOT FOR DISEASE AWARENESS

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Healthcare accessibility and health literacy remain persistent challenges in rural and semi-urban regions, particularly in developing countries, where shortages of medical professionals, limited infrastructure, and linguistic diversity hinder the effective dissemination of reliable health information. Insufficient awareness regarding disease symptoms, preventive healthcare practices, and vaccination schedules often contribute to delayed medical consultation, increased vulnerability during outbreaks, and the spread of health-related misinformation. To address these challenges, this paper presents Swasthya Sahayak, an AI-driven multilingual public health chatbot designed to enhance disease awareness and preventive healthcare literacy among underserved populations. The proposed system enables users to interact through natural language queries and receive simplified, context-aware responses related to commonly reported disease symptoms (informational listing only), preventive measures, vaccination programs, and public health advisories. The chatbot is for strictly non-diagnostic purposes and does not dispense medical diagnoses, treatment advice or emergency instructions. Swasthya Sahayak follows the direct of core architecture. This scalable and modular solution: introduces Natural Language Processing, multi-lingual capability, curated public health knowledge base information from authentic health institutions. The system has been engineered as a low-feature web-based tool, with the possibility of being integrated into low-bandwidth communication platforms (e.g. WhatsApp, SMS) for deployment in heterogeneous user settings. A administrative material module includes real-time release of outbreak alert and health advisory to complete the public health awareness. This paper discusses the literature background, system architecture, modular design, and functional components of the proposed system, highlighting its suitability for community-level public health education. By focusing on ethical AI deployment, accessibility, and information accuracy, Swasthya Sahayak demonstrates the potential of conversational AI systems to support public health initiatives and improve healthcare awareness in resource-constrained settings.

606.HUMAN PRESENCE DETECTION IN PULSE-DOPPLER RADAR: A COMPARATIVE STUDY OF CLASSICAL SVM VS. HYBRID VGG16- SVM USING THE RADECH DATABASE

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In this paper, a Pulse-Doppler radar spectrogram-based human presence detection system is presented. Two pipelines for classification are created and contrasted. In the first, a Support Vector Machine (SVM) is used to classify hand-crafted statistical variables such as mean, variance, skewness, and kurtosis. The second pipeline combines a pretrained VGG16 network for deep feature extraction, Principal Component Analysis (PCA) for dimensionality reduction, and SVM for classification. Experiments on the RadEch dataset show that the hybrid VGG16-SVM pipeline achieves 97% accuracy with balanced precision, recall, and F1-scores, whereas the

handmade SVM pipeline obtains an accuracy of 79.9%. These findings demonstrate the benefits of integrating deep learning with traditional machine learning for reliable radar based human presence identification, providing an environment-independent and privacy-preserving substitute for vision-based techniques.

607.AN INTEGRATED MOBILE PLATFORM FOR FINANCIAL LITERACY AND PERSONAL FINANCE MANAGEMENT AMONG STUDENTS

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In spite of increased international focus on financial literacy, a critical demographic—students—are still not well served by extant financial technologies. Conventional personal finance applications assume adult-scale incomes, banking account linking, and existing financial literacy and are therefore unavailable to young users to some considerable extent [2]. This study suggests a mobile app that closes the gap between student learning personal finance and students' financial literacy in the age bracket of 18 to 25 years. It combines budgeting elements, gamified learning modules, and artificial intelligence (AI), and location-based expense tracking using Google Maps to provide an engaging and personalized experience. It is developed with React Native to ensure cross-platform compatibility and Google Firestore for real-time scalable backend operations. By highlighting the education and behavioral needs of students, the system under consideration seeks to induce lifelong fiscal responsibility through the establishment of good habits at a young age.

608.EARLY DETECTION OF ORAL MALIGNANCIES THROUGH CONVOLUTIONAL NEURAL NETWORKS

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Saving the lives and making cancer treatment more effective makes easy to detect oral cancer early. This research is about creating an automated tool that determines if an oral tissue is normal or cancerous by using deep learning methods. We built a custom convolutional neural network (CNN) that figures out which features to look at by itself from the pictures of the oral cavity. In order to train the model well we took a set of pictures very carefully and used techniques like normalization and image augmentation in order to both improve and enlarge the dataset. The model has a number of convolutional and pooling layers which are used to extract detailed features, while the dense layers are responsible for the final classification. We divided the data into training and validation sets so that the performance could be measured in an unbiased manner. The outcomes indicate that the accuracy is quite good which means that the system can be a source of fast and reliable screening for oral cancer to the healthcare professionals. In the end, this instrument is intended to facilitate early diagnosis and enhance the clinicians' decision-making process.

609.EXPLAINABLE AI IN COURT CASE ANALYSIS

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The rapid growth of digital court records places a higher demand for automated tools that can analyze legal documents with consistency, accuracy, and transparency. This work presents a LegalBERT-based judgment prediction system that classifies court case documents into three verdict categories such as Positive, Neutral, and Negative, using real-world case texts collected from digitized PDF judgments and authorized legal repositories. A thorough preprocessing pipeline was followed to extract, clean, and standardize case facts, evidence summaries, witness statements, and argument sections to provide quality input for model training. The proposed

system is fine-tuned on this curated dataset in a supervised learning manner that provides an academically reliable accuracy of approximately 95% on the held-out test set. It is integrated with an explainability layer, using SHAP and Integrated Gradients for token-level visual justifications of predictions. These explanations show the main legal factors, arguments, and evidence that influenced the decision of the model, thus providing transparency for legal and academic adoption. The system is deployed through a FastAPI backend with a user-friendly web interface that allows the classification of documents in real time, visualizing influential text segments. The results clearly show the capability of the proposed system to support legal research and decision assistance tasks by making fast, consistent, and interpretable verdict predictions. This study presents the first step toward robust AI-assisted judicial analytics and forms a basis for further work on integrating with more sophisticated legal reasoning approaches.

610.IOT-BASED SMART THIEF DETECTION AND ALERT SYSTEM USING ESP32

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It proposes an IoT-based smart thief detection and alert system that applies a central processing unit with an ESP32 microcontroller. The system, with sensors like the ZMCT103C, PZEM-004T, and a capacitive soil

moisture sensor, is always monitoring electrical current flow, ground stability, and environmental conditions to detect suspicious activities. This provides timely notification of abnormal electrical usage or any form of vibration that may be considered theft or tampering. It sends real-time alerts via Wi-Fi to users on changes in power fluctuations, soil conditions, and security status through a web-based dashboard that can be remotely monitored. The proposed system enhances reliability, safety, and automation both at industrial and domestic levels.

611.DETECTION OF PNEUMONIA FROM CHEST X-RAY IMAGES USING VISION TRANSFORMERS

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Pneumonia has been directly responsible for a huge number of deaths all across the globe. Chest X-ray imaging is the most useful diagnostic tool for identifying pneumonia, but with manual interpretation by doctors with naked eyes can be error-prone, and inconsistent, particularly in areas with limited medical resources. Traditional deep learning models have been widely used for pneumonia classification and have shown high accuracy. However, most focus purely on classification without indicating where pneumonia is present, which limits their clinical interpretability. More recently, Visual Transformers (ViT), also the varieties of them and DETR++ have gained more attention for vision tasks. In this project, we propose a MedViT-based system integrated with DETR++ that performs both pneumonia classification and object detection to localize infected regions in chest X-rays. The healthcare diagnostic system utilizes this model for improved turnaround time and enhanced coverage of healthcare services. The paper points that Vision Transformers demonstrates potential as a scalable solution which detects the disease.

612.AI-POWERED PERSONALIZED DIET RECOMMENDATION SYSTEM FOR LIFESTYLE DISORDER MANAGEMENT

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This project is an AI-Powered Personalized Diet Recommendation System designed to help individuals manage lifestyle disorders through intelligent, budget-conscious meal planning. The system generates personalized diet plans based on user profiles including age, gender, height, weight, activity level, health conditions (diabetes, obesity, hypertension, PCOD), dietary preferences, allergies, and daily budget constraints. The application leverages algorithmic meal selection and cost optimization to provide nutritionally balanced diet plans that respect both health requirements and financial limitations. It includes features such as automatic food substitution for budget optimization, shopping list generation, progress tracking, and multilingual voice narration (English and Hindi) for enhanced accessibility.

613.RENTEASY - A RENTAL APPLICATION BASED ON GEO LOCATION, USER RECOMMENDATIONS & CUSTOMER REQUEST

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Peer-to-peer car rental is crucial in the rapidly evolving digital transportation landscape and for the growing population. Not every car enthusiast can afford to buy their own vehicle, and many of them keep it idle at home. This gap can be filled by allowing the owners to rent their car to someone who needs it. As a result, the rental services evolved. There are many rental applications and rental companies that exist with certain flaws. These services can be improved by a well-designed application with practical features that are user-friendly and interactive for the end-users. Enhancing these platforms essentially increases users' flexibility and cost-effectiveness. Although the applications were developed with many features, they still have several limitations, such as handling user needs, static vehicle listings, and disputes in tracking the vehicle. This paper proposes RentEasy, a location-based peer-to-peer car rental web application that allows users to request their specific needs directly. In turn, the request will be shared within the defined location, enabling vehicle owners to respond with matching offers. Whenever a person without vehicle knowledge needs a car for personal use, the platform associated with intelligence helps them to find out the best option through a series of questions, based on the information, and cars will be filtered out. If not available, it will suggest other similar cars, which increases the overall satisfaction of the customer. This platform integrates GPS tracking and dashcam monitoring. These features were tested and evaluated in a well-defined environment to check their real-time performance. Thus, the proposed system ensures improved rental efficiency, reliable system performance, user interactivity, and enhanced trust. RentEasy demonstrates how user recommendations and location-based interaction can support scalable, transparent, and user-friendly peer-to-peer car rental services in future mobility environments.

614.AIML-BASED SAFETY JACKET

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In hazardous environments and during travel, personal safety is a growing concern. This paper presents the design and development of an AI/ML- and cloud-based smart safety jacket built on a Raspberry Pi platform. The proposed system provides real-time monitoring and intelligent analysis of a wearer's condition and surroundings. It integrates a heart-rate sensor for physiological monitoring, a USB camera for visual data, a GPS module for location tracking, and a push-button trigger. An onboard machine learning algorithm processes camera images to detect unsafe situations (e.g. an assailant or dangerous environment), while sensor data continuously checks vital signs. Upon detecting an emergency or abnormal condition, the system generates alerts through multiple channels. A GSM module sends SMS messages and initiates a voice call to predefined contacts, including the user's location and status, and an onboard LED and buzzer provide immediate local indication. All collected data (health metrics, location, images, and timestamps) are uploaded to a cloud

platform for remote monitoring. A cloud dashboard enables authorities or family members to view the wearer's live location and health status. The autonomous, intelligent safety jacket significantly improves emergency response by reducing false alarms and shortening response times compared to conventional threshold-based safety devices. Its modular, low-cost design makes it suitable for use by industrial workers, lone travelers, and individuals in high-risk environments

615.ADAPTIVE E-LEARNING SYSTEM WITH REAL-TIME PERSONALIZATION USING LEARNER BEHAVIOUR ANALYTICS

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This project presents an AI-powered adaptive learning platform designed to improve how students interact with study materials. The system can process different types of content, including PDFs and text documents, and automatically convert them into useful learning resources such as short summaries, flashcards, and personalized quizzes. By doing this, the platform transforms static study material into a more engaging and interactive learning experience. A key feature of the system is an integrated chatbot that allows students to ask questions and receive instant answers based on their learning content. To support better understanding, the platform also recommends relevant YouTube videos, creating a multimedia learning pathway that helps reinforce important concepts. In addition, a performance analytics module tracks student progress and quiz results to identify strengths and areas that need improvement. Using this information, the system provides personalized feedback and targeted learning support, helping students learn more effectively and improve their academic performance.

616.POSEMATE: AN AI-POWERED YOGA ASSISTANT WITH REAL-TIME FEEDBACK FOR POSTURE CORRECTION

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Incorrect yoga postures can diminish therapeutic benefits and potentially cause injuries, particularly among practitioners without professional supervision. This paper proposes PoseMate, an intelligent yoga assistance system that integrates MediaPipe-based skeletal landmark extraction with skeleton augmented deep learning for real-time posture analysis and correction. The system employs computer vision techniques to detect yoga poses, evaluate postural alignment, and provide multimodal feedback including visual overlays, textual guidance, and multilingual audio instructions. Experimental evaluation demonstrates high accuracy in pose detection and landmark tracking across varying lighting conditions and video quality. The skeleton-augmented learning approach significantly improves model performance compared to image-only methods. User studies reveal measurable improvements in posture correction when practitioners utilize the system's feedback mechanisms. These findings indicate that AI-powered systems like PoseMate can deliver accurate, accessible guidance for home-based yoga practice, contributing to the advancement of intelligent digital health applications.

617.DEEP LEARNING–BASED SENTIMENT ANALYSIS FRAMEWORK FOR ONLINE REVIEWS USING HYBRID EMBEDDINGS

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Online reviews are gold for buyers and sellers Reviews have become a pillar of modern digital commerce, helping determine not only what we buy, but whether we buy at all. However, explosion of multilingual unstructured text and manual review interpretation can't keep up and it is very subjective. To overcome these

challenges, in this paper we propose Sentiment X, a hybrid deep-learning based sentiment analysis framework that combines statistical and contextual embeddings to achieve accurate and scalable sentiment classification. The architecture proposed is based on the combination of TF-IDF, Vec XY (word2Vec), and BERT embeddings to capture syntactic information, semantic relations, and bidirectional context dependencies all together. Due to the integration of these two distinctive representations, our framework offers robust performance on diverse review datasets. Experiments show that the proposed hybrid model outperforms traditional machine learning baselines by large margins, with an accuracy of 97.6% on multilingual corpora. Engineered for efficiency and practical use cases, SentimentX is a lightweight yet high-impact solution that enables low-latency inference, interpretability with SHAP/attention mechanisms, and easy deployment to deliver industry solutions in e-commerce analytics or customer experience monitoring.

618.A COMPARATIVE STUDY: MACHINE LEARNING AND DEEP LEARNING APPROACHES FOR EXPLAINABLE HARD DISK FAILURE PREDICTION USING SMART ATTRIBUTES

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Hard Disk Drive (HDD) failures can lead to severe data loss and system downtime, making predictive maintenance essential in modern storage systems. SMART attributes provide valuable indicators of disk health, but traditional threshold-based monitoring often fails to detect early degradation. This paper presents a comparative predictive-maintenance framework combining a Machine Learning based system (DRIVE SAFE) and a Deep Learning Bi-LSTM based early failure prediction model. The machine learning framework integrates preprocessing, SMOTE-based class balancing, Min–Max scaling, PCA-driven dimensionality reduction, and a Random Forest classifier to classify disk health. The deep learning framework models temporal SMART logs using a Bi-LSTM network with sliding windows and explainable AI support. Experimental analysis shows that machine learning provides efficient and interpretable disk health classification, while deep learning improves early failure prediction through temporal modeling.

619.GENERATIVE AI FOR SALES AND MARKETING OPTIMIZATION USING A CONTEXT-AWARE FRAMEWORK FOR PERSONALIZED SALES MESSAGING

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The growing need of smart and responsive digital marketing plans has revealed the drawback of the traditional rule-based sales communication solutions. The system of static templates and the use of generic outreach techniques do not tend to consider the specific preferences of customers, their behavioral patterns, and signals related to the context, the result of which is a decreased engagement and conversion result. The proposed paper offers a situational-based generative AI system that can provide individuals with personalized sales messages through various communication platforms. The proposed system combines predictive analytics, customer profiling and natural language generation into a single architecture that is able to dynamically adjust message content using the real time history of interaction and situational context. In contrast to the traditional marketing automation tools, the framework focuses on adaptive learning by optimizing the communication strategies through the feedback loop. Mixed retail and B2B experimental evaluation shows quantifiable better engagement rates, click-through-behaviour and conversion responses than the static messaging systems. Besides this, the framework includes privacy sensitive data processing and bias reduction methods that help in ethical implementation in business world. The unique combination of personalization, contextual intelligence and responsible AI design offers the proposed approach as scalable to meet the demands of modern multi-channel marketing. The results suggest that generative AI can contribute to the effectiveness of customer interaction dramatically without destroying transparency, equity, and trust in the sales interactions with the help of an automated system.

620.WORKSAFE-GUARD: A YOLOV12 AND CONVLSTM APPROACH FOR MONITORING WORKER SAFETY AND ACCIDENT PREVENTION

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One of the critical challenges of ensuring workplace safety involves industrial environments where workers are continuously exposed to physical and operational risks. Traditional manual supervision often fails to identify unsafe behaviors, improper PPE use and dangerous tool/machinery presence consistently. Considering these limitations, this paper proposes a Smart Safety Surveillance System powered by a deep learning based object detection framework using YOLOv12. The proposed system will be able to detect PPE violations, unsafe worker postures, fatigue conditions and hazardous equipment in real time from live video feeds. The system will use visual data from live video feeds analyzed using high speed deep learning inference to find the associated safety risks and generate timely alerts to safety personnel. Aside from monitoring PPE compliance, the framework incorporates posture analysis and equipment proximity detection to provide comprehensive assessment of workplace safety. Automated risk detection integrated with real time analytics allows for proactive intervention and reduces dependency on continuous human supervision. Experimental evaluation demonstrates that the proposed system attains high accuracy detection with low latency in execution, making it suitable for industrial real time deployment. By combining fast object detection with human centric safety monitoring, the proposed solution enhances situational awareness and builds up safer and more supportive work environments.

621.SMARTHIRE: AN INTELLIGENT PLACEMENT MANAGEMENT SYSTEM

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Campus placements are a very important phase of educational life of every student because they relate education and employment life. In spite of their vital significance, the institutions still use traditional and informal communication channels such as emails, notice boards, and group messages to deliver placement information. This is likely to cause miscommunication, delays, and even loss of opportunities to students. To address such issues, the project proposed in this paper proposes a Smart Placement Management System, a web-based application that integrates the entire placement process and makes it simple and automated. The system has special modules of company notifications, eligibility checks, shortlist, schedule and query resolution. All these functionalities together in the same platform makes it promote more coordination between the students and the placement office. Lastly, this system improves its transparency, efficiency, and accessibility with minimum manual effort and communication shortcomings.

622.REAL-TIME SUSPICIOUS ACTIVITY DETECTION SYSTEM

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Contemporary networked camera infrastructures generate unprecedented visual data volumes, demanding intelligent interpretation mechanisms beyond human monitoring capabilities. This work introduces an integrated neural framework combining convolutional spatial encoders with recurrent temporal processors for automated behavioral anomaly identification. Our dual-pathway architecture extracts hierarchical visual representations from sequential image frames while modeling evolutionary patterns across time windows. The implemented platform handles streaming feeds and archived content, incorporating browser-accessible visualization with instant alert propagation. Controlled experiments demonstrate 94.6% classification fidelity with 1.3-second inference cycles, validating production readiness. Enhanced preprocessing workflows, environment-responsive threshold modulation, and multi-resolution feature hierarchies collectively strengthen operational robustness across heterogeneous deployment contexts.

623.LESION-AWARE ORDINAL TRANSFORMER FOR LEAKAGE-FREE DIABETIC RETINOPATHY DETECTION

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Diabetic retinopathy is a leading cause of preventable blindness, requiring accurate and reliable automated screening systems. Recent deep learning approaches report high performance; however, many suffer from hidden data leakage, particularly patient-level overlap across training, validation, and test splits, leading to overly optimistic results. In this work, we present a leakage-free, large-scale diabetic retinopathy dataset constructed by rigorously eliminating both image-level and patient-level leakage across multiple public fundus datasets. Building upon this clean foundation, we propose a lesion-aware ordinal transformer that explicitly

models disease severity progression while focusing on clinically relevant retinal lesions. The proposed framework integrates ordinal regression, transformer based global context modeling, explainable artificial intelligence techniques, and cross-dataset generalization evaluation. Extensive experiments demonstrate robust performance, improved generalization, and clinically interpretable predictions, establishing a reliable benchmark for leakage-free diabetic retinopathy detection.

624.AI-DRIVEN HYBRID MOCK INTERVIEW PLATFORM WITH ACCESSIBILITY SUPPORT

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In the rapidly evolving landscape of global recruitment, the interview process remains the definitive yet most daunting hurdle for job seekers. While corporate entities have aggressively adopted Artificial Intelligence (AI) to automate candidate screening—often deploying opaque "black box" algorithms that prioritize efficiency over transparency—candidates, particularly students and individuals with disabilities, face a widening "preparation gap." This research paper presents the design, implementation, and rigorous evaluation of a comprehensive AI-Powered Real-Time Mock Interview Simulation System. Unlike conventional tools that function as gatekeepers, this system operates as an "Intelligent Coach," leveraging a novel integration of Natural Language Processing (NLP), Computer Vision, and Audio Signal Processing to democratize interview preparation. The proposed architecture employs a sophisticated four-phase pipeline: (1) Context Extraction, utilizing Named Entity Recognition (NER) to parse resumes and identify skill gaps via cosine similarity analysis; (2) Dynamic Question Generation, employing Large Language Models (LLMs) to create adaptive, role-specific inquiries that mimic human interviewers; (3) Multi-Modal Real-Time Monitoring, fusing data from MediaPipe Face Mesh and DeepFace for behavioral analysis (facial expressions, gaze tracking) with Librosa-based spectral analysis for vocal modulation and pacing; and (4) A Constructive Feedback Loop, featuring a pioneering "Golden Answer" generator that rewrites user responses into industry-standard STAR (Situation, Task, Action, Result) formats. A distinguishing contribution of this work is its "Accessibility-First" design, incorporating live captioning and voice navigation to ensure equitable access for visually and hearing-impaired candidates.

625.DROPOUT-INTEGRATED LENET FOR ACCURATE ALZHEIMER'S DISEASE CLASSIFICATION USING SELECT HIPPOCAMPAL MRI SLICES

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Alzheimer's Disease (AD) is a progressive neurodegenerative disorder that requires early and accurate diagnosis for effective clinical management. Recent deep learning approaches using MRI data often suffer from overfitting and reduced generalization due to limited training samples and high data variability. To address this issue, this work presents an extended Alzheimer's Disease classification framework using landmark-guided hippocampal MRI slice selection combined with a Dropout-enhanced LeNet convolutional neural network. The inclusion of a Dropout layer improves model robustness by reducing overfitting and enhancing generalization

performance. Experiments conducted on the publicly available Alzheimer's Disease Neuroimaging Initiative (ADNI) dataset demonstrate that the proposed LeNet with Dropout achieves significantly improved classification performance, reaching up to 100% accuracy across selected hippocampal views. Furthermore, a secure and user-friendly Flask-based interface with authentication is developed to facilitate real-time system testing and result visualization. The experimental results validate that the proposed extension enhances diagnostic accuracy, model stability, and practical usability, making it a reliable tool for computer-aided Alzheimer's Disease diagnosis.

626. HUMAN ASSISTIVE PNEUMATIC EXOSKELETON ARM FOR REHABILITATION AND STRENGTH ENHANCEMENT

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This paper presents the design and development of a human assistive pneumatic exoskeleton arm intended for rehabilitation and strength enhancement applications. The proposed system is designed to support human arm movements by providing additional force through pneumatic actuators, thereby reducing muscular effort during lifting and repetitive motions. The exoskeleton structure is lightweight, wearable, and ergonomically designed to ensure user comfort and safety. Controlled compressed air is used to generate smooth and reliable motion suitable for therapeutic and assistive purposes. Experimental evaluation of the prototype demonstrates effective assistance in arm movement, improved load-handling capability, and reduced physical strain on the user. Owing to its simple construction, cost-effectiveness, and safe operation, the developed pneumatic exoskeleton arm can be effectively used in rehabilitation centers, industrial assistance, and strength enhancement applications.

627. WORKSAFE-GUARD: A YOLOV12 AND CONVLSTM APPROACH FOR MONITORING WORKER SAFETY AND ACCIDENT PREVENTION

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One of the critical challenges of ensuring work place safety involves industrial environments where workers are continuously exposed to physical and operational risks. Traditional manual supervision often fails to identify unsafe behaviors, improper PPE use and dangerous tool/machinery presence consistently. Considering these limitations, this paper proposes a Smart Safety Surveillance System powered by a deep learning based object detection framework using YOLOv12. The proposed system will be able to detect PPE violations, unsafe worker postures, fatigue conditions and hazardous equipment in real time from live video feeds. The system will use visual data from live video feeds analyzed using high speed deep learning inference to find the associated safety risks and generate timely alerts to safety personnel. Aside from monitoring PPE compliance, the framework incorporates posture analysis and equipment proximity detection to provide comprehensive assessment of workplace safety. Automated risk detection integrated with real time analytics allows for proactive intervention and reduces dependency on continuous human supervision. Experimental evaluation demonstrates that the proposed system attains high accuracy detection with low latency in execution, making it suitable for industrial real time deployment. By combining fast object detection with human centric safety monitoring, the proposed solution enhances situational awareness and builds up safer and more supportive work environments.

628.DESIGN AND IMPLEMENTATION OF A LOW-POWER VISION TRANSFORMER ACCELERATOR ON FPGA

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The Vision Transformer (ViT) emerged as the most popular state-of-the-art computer vision architecture, and it is more effective than the traditional Convolutional Neural Network (CNN) on most benchmark tasks. However, ViTs take computationally expensive operation and consume a lot of memory, posing a severe restriction on use in resource-constrained edge computing systems. It is a professional hardware accelerator for ViTs on FPGAs ViTs on hardware accelerator description paper. We propose a combined algorithm-hardware co-design approach, including of hardware-friendly token dynamic pruning, dynamic Feed-Forward Network (FFN) weight pruning, as well as low bit-quantization. Our processor unit is called systolic array implementation and supports Layer Normalization and Softmax optimized non-linear modules. Experimentally, it is demonstrated that this proposed accelerator can have a maximum throughput of 1024 GOPS and an energy consumption of 2.31 TOPS/W, an improvement of 5.85x compared to high end GPU baselines with a loss of accuracy of less than 2%.

629. AN INTELLIGENT FACE RECOGNITION FRAMEWORK FOR REAL-TIME CRIMINAL DETECTION IN HIGH-DENSITY PUBLIC ENVIRONMENTS

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The rapid expansion of surveillance infrastructures across urban environments has significantly increased the volume of video data generated in real time. Manual monitoring of such large-scale surveillance networks is inefficient and prone to human error, particularly in high-density public environments characterized by crowd congestion, pose variations, illumination changes, and motion blur. Traditional face recognition approaches based on handcrafted features lack robustness under such unconstrained conditions. This paper presents a CPU-optimized deep learning framework for real-time face recognition-based criminal detection designed specifically for high-density surveillance scenarios. The proposed system integrates Multi-task Cascaded Convolutional Networks (MTCNN) for accurate face detection and alignment, followed by a custom-trained TensorFlow embedding model for identity recognition using similarity-based threshold matching. The framework is trained on multi-angle real-world datasets and deployed under CPU-constrained environments to ensure practical feasibility. Experimental evaluation under controlled testing conditions achieved an average recognition accuracy of approximately 95%. The proposed architecture emphasizes computational efficiency, scalability, and secure biometric handling, making it suitable for distributed public surveillance systems.

630.VOXAI: CONVERSATIONAL VOICE AGENT FOR AUTOMATED FEEDBACK COLLECTION AND ANALYSIS IN HOME SERVICE PLATFORMS

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Customer feedback significantly contributes to the improvement of service quality in service-oriented fields, but the present feedback systems are mainly manual and not efficient. Focusing on this gap, this paper presents VoxAI, a conversational voice agent designed to automate post-service feedback collection and store the responses in a structured form for later analysis. The proposed system combines a conversational interface powered by ElevenLabs with a Flask backend, and an SQLite database that manages users, bookings, technician and feedback details. In Phase I, three core modules were implemented: a browser-based voice interaction layer with speech processing through ElevenLabs' speech-to-text and text-to-speech services. Along with a REST API layer that handles feedback linked to recent service bookings. The system is designed to be extended with an emotion and sentiment analysis agent using LangGraph, and a Streamlit dashboard to provide visual analytics and insights of the services. Experimental evaluation in controlled conditions shows high transcription accuracy, low latency, and reliable database operations, showcasing that this lightweight architecture can deliver natural, scalable voice-based feedback interactions on simple hardware. These results indicate that VoxAI can be used as a practical foundation for emotionally aware, data-driven customer engagement in small and medium home-service enterprises.

631.AI-DRIVEN SYNTHETIC IDENTITY THEFT AND FINANCIAL FRAUD: DETECTION, PREVENTION, AND REGULATORY CHALLENGES IN DIGITAL BANKING ECOSYSTEMS

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The accelerated adoption of digital banking and fintech platforms has significantly increased exposure to complex financial crimes, with synthetic identity theft emerging as one of the most persistent and difficult-to-detect fraud types in modern financial ecosystems [2], [4], [7]. Unlike traditional identity fraud, synthetic identity fraud combines fabricated and legitimate personal attributes to construct fictitious identities that can

bypass conventional Know Your Customer (KYC) and Anti-Money Laundering (AML) controls, often remaining undetected for extended periods [6], [11]. This paper examines AI-driven approaches for detecting and preventing synthetic identity theft and financial fraud, while also addressing the regulatory and governance challenges faced by digital banking institutions. Building on recent advances in machine learning and deep learning, this study synthesizes findings from supervised, unsupervised, and hybrid fraud detection models, including ensemble learning, LSTM-based architectures, CNN-LSTM hybrids, and deep neural networks applied to transactional and behavioural data [1], [3], [5], [9], [14]. The literature indicates that hybrid and ensemble models consistently outperform rule-based and single-model approaches in terms of detection accuracy, robustness to class imbalance, and adaptability to evolving fraud patterns [3], [9], [12]. Additionally, emerging techniques such as behavioural biometrics, synthetic data generation, and multi-modal anomaly detection show strong potential to mitigate deepfake-enabled identity fraud and improve resilience to data scarcity [6], [11]. Beyond technical performance, the paper highlights critical regulatory challenges, including data privacy, algorithmic bias, transparency, and explainability, which are essential for compliance with global regulatory frameworks and for maintaining institutional trust [8], [10]. The findings underscore the importance of explainable, regulation-aware AI systems that balance fraud-prevention effectiveness with ethical and legal constraints. By consolidating insights from recent empirical studies and systematic reviews, this work provides practical guidance for financial institutions and policymakers seeking to deploy scalable, compliant, and future-ready AI solutions to combat synthetic identity theft in digital banking environments [1], [7], [12].

632.A NOVEL MULTI-STAGE STACKED LEARNING FRAMEWORK FOR CARDIOVASCULAR RISK STRATIFICATION

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Cardiovascular diseases (CVDs) remain the leading cause of global mortality, necessitating accurate and early risk stratification to improve clinical outcomes. This paper presents a novel multi-stage stacked learning framework for robust cardiovascular risk prediction by leveraging heterogeneous machine learning models in a hierarchical architecture. The proposed framework consists of a feature extraction layer followed by multiple base learners, including Support Vector Machine (SVM), Random Forest, XGBoost, and deep learning-based models, which capture diverse statistical and nonlinear patterns from clinical and imaging data. A meta-classifier aggregates the predictions of these base learners to generate a unified and optimized risk score. Experimental evaluation conducted on a benchmark cardiovascular dataset demonstrates that the proposed stacked architecture outperforms conventional single-model approaches and traditional ensemble techniques in terms of accuracy, precision, recall, and F1-score. The results highlight the effectiveness of multi-stage stacked learning in enhancing predictive robustness and supporting reliable clinical decision-making for early cardiovascular risk stratification.

633.ALETHEIA - DISTRIBUTED GRAPH-RAG FOR UNSTRUCTURED DATA

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The growth of unstructured data is fast and so it is an uphill task to get acceptable and relevant contextual information in large scale. The traditional information search methods and the present Retrieval-Augmented Generation methods rely on a similarity between vectors, which is not always semantically consistent and introduces partial context, inefficient think and hallucinatory llmm results. Also the current RAG pipelines are blackboxes and hence do not allow much transparency into the process of generating responses. This paper will introduce Aletheia, a Graph-based RAG (Graph-RAG) system, which transforms unorganized text into structured Knowledge Graphs to make the process of explainable and grounded retrieval possible. Aletheia relies on Apache PySpark to consume distributed data, serverless workspace on GPUs to read large volumes of data in a single entity and relation and a graph database to do multi-hop reasoning. Its Tri-View Interface is more open to the point that it displays graphs and source documents besides response that are generated. Aletheia has been seen to be superior than the contextual reasoning of the vector based RAG systems, reduces hallucinations and increases the confidence of the user.

634.AI-DRIVEN HYBRID CNN-TRANSFORMER MODEL FOR DETECTING CARDIOTOXICITY IN CANCER CHEMOTHERAPY PATIENTS

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Chemotherapy-induced cardiotoxicity (CIC) is a serious effect that can lead to irreversible cardiac dysfunction, making early and accurate detection crucial for effective patient management. This work presents an AI-driven hybrid CNN–Transformer framework for automated CIC detection from echocardiography data, formulated as a binary classification task between cardiotoxicity and non-cardiotoxicity cases. The model integrates convolutional neural networks for discriminative spatial feature extraction with Transformer layers to capture global and temporal cardiac motion patterns, enabling robust representation learning without reliance on handcrafted features. Experimental evaluation demonstrates an overall detection accuracy of 92.2%, achieving competitive performance against recent deep learning approaches, including CoreEcho and R3D Transformer models. The proposed framework also exhibits improved generalization and computational efficiency, supporting scalability across diverse clinical settings. Furthermore, the model’s automated design reduces observer dependency and enhances diagnostic consistency. These results highlight the potential of hybrid CNN–Transformer architectures for non-invasive, reliable, and early cardiotoxicity screening in real-world oncology practice.

635.SMART VISION – REAL TIME FACE DETECTION IN CROWDED ENVIRONMENT

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The growing reliance on urban surveillance and intelligent monitoring systems has created an urgent demand for precise and efficient real-time facial detection technologies. Conventional methods often struggle in highly populated environments due to visual obstructions, uneven lighting, and overlapping faces. To address these limitations, this paper introduces Smart Vision, a real-time face detection and recognition framework utilizing the YOLOv12 deep learning algorithm. The model is trained on a custom dataset curated with Roboflow and optimized using GPU resources in Google Colab to enhance accuracy and inference speed. Smart Vision processes continuous video streams, detects multiple faces simultaneously, and matches them against a pre-established database to aid in identifying missing or suspicious individuals. Experimental analysis shows that YOLOv12 offers superior precision and recall compared to previous YOLO versions, maintaining stable detection accuracy even in dense and dynamic scenes. Owing to its adaptability, processing efficiency, and robustness, Smart Vision demonstrates strong potential for use in public safety, crowd surveillance, and law enforcement applications.

636.DECENTRALIZED BLOCKCHAIN-BASED FUND MANAGEMENT SYSTEM FOR TRANSPARENT AND SECURE MEDICAL TRANSACTIONS

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The article concentrates on the creation and application of a decentralized system of managing funds through the use of a blockchain network. This is a system that allows automated and secure transactions. It uses blockchain to form permanent records of transactions, smart contracts to distribute funds automatically according to the predefined rules and encryption to ensure the security of the system. We have built a hybrid storage system that supports the storage of medical documents, and the cryptographic hash of that document is stored on the blockchain to provide integrity. This arrangement offers a state of transparency in the following of the donations made by the contributors. It also tracks the financial patterns of contributors to the hospitals and patients. The system automatically makes settlements after verifying treatment as using the proposed method. This will help to decrease operational expenses and minimize the possibility of fraud, which leads to the increased credibility of stakeholders without the involvement of any intermediaries. The suggested system is an excellent example of how a blockchain technology will be used to manage the financial aspects of medical services in a transparent and responsible way.

637.PCB DESIGN FOR ESP32-S3-WROOM-1 & PIC18F47K42 BASED IOT CONTROL AND MONITORING BOARD

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This project presents the design and development of a dual-MCU IoT control and automation board that integrates the ESP32-S3-WROOM-1 and PIC18F47K42 microcontrollers to achieve high-performance, reliable, and scalable automation. The ESP32-S3 serves as the communication and cloud processing unit, providing robust Wi-Fi and Bluetooth connectivity, secure MQTT/HTTP data exchange, remote monitoring, OTA firmware updates, and AI-capable edge processing. Meanwhile, the PIC18F47K42 functions as the dedicated control microcontroller responsible for analog data acquisition, sensor interfacing, PWM/relay/motor control, realtime event handling, and execution of safety-critical processes even during communication-intensive operations. The system architecture separates communication tasks from hardware control tasks, ensuring low latency, reduced CPU load, and improved fault isolation. The board supports multiple sensors, actuators, and expansion interfaces, making it suitable for a wide range of applications such as home automation, industrial process control, energy management, smart agriculture, and data acquisition systems. Through the integration of dual MCUs, the platform delivers enhanced modularity, high reliability, and flexible IoT deployment with advanced monitoring and automation capabilities. This dual-MCU design enables continuous operation even if one controller resets or encounters network delays, ensuring system resiliency and efficient performance in real-time environments.

638.A WIRELESS-ENABLED RAILWAY SAFETY SYSTEM FOR TRACK DEFECT DETECTION AND GATE CROSSING AUTOMATION

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Railway safety is a major issue, mainly due to obstructions on the track and danger-at-level crossings. In this paper, a simple and cost – effective solution is introduced to overcome these limitations. In this system, the infrared sensor is employed for scanning the track for obstructions such as rocks, debris, etc., and reports the same to the train controller system wirelessly, using a Bluetooth system, as soon as it recognizes the obstruction on the track. According to the warning, the train speed can be reduced or the train stopped whenever it is required. The system has proved to be effective and has responded promptly and functionally. In addition to monitoring the railway tracks on a continuous basis, an automatic level crossing system has been incorporated to improve safety at level crossings. This system uses vibration sensors to detect an approaching train when it is close to the level crossing. These inputs are fed into a microprocessor, which in turn controls the gates without any need to involve a human being in between. Also, servo motors ensure that the movement of barriers takes place in a smooth and controlled manner, closing when the train approaches and again opening when it has fully passed through. This ensures that road and train accidents are minimized in crossing junctions. Thus, it reduces human error and has improved safety in railways.

639.IOT-BASED PRISON SAFETY ENHANCEMENT USING STRESS MONITORING AND CONFLICT PREDICTION

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–The concern of safety and security in correctional facilities is a serious issue owing to the factors of overcrowding, understaffing and the rising number of instances of inmate violence. Conventional surveillance systems are largely manual and ineffective in predicting instances of conflict before they occur. This paper presents an Internet of Things (IoT) prison safety enhancement system utilizing infrared sensors, wearable technology, and a hybrid deep learning approach for real-time stress analysis and conflict prediction. Infrared

sensors are utilized for the detection of illegal inmate movement, while wearable sensors are used to continuously track inmates physiological and proximity-driven interaction patterns. Multivariate time-series patterns are analyzed utilizing a hybrid Convolutional Neural Network-Temporal Convolutional Network (CNN-TCN) model, which is highly effective in identifying spatial patterns and long-term temporal patterns in aggressive and violent inmate behaviour. Experimental evaluation carried out on a well-balanced dataset shows that the proposed model has an accuracy of 97.06%, which is better than the existing conventional machine learning models like SVM, Random Forest, and LSTM models. The Proposed system allows early detection of possible conflicts and sends alerts accordingly, thus reducing the need for manual surveillance. The proposed framework provides a proactive and scalable solution for improving prison safety and supports informed decision-making in modern prison management systems.

640.MACHINE LEARNING BASED FAULT DIAGNOSIS OF ELECTRIC DRIVES

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Fault detection in electric drives is crucial to ensuring system dependability, performance, and safety. Electric drives, especially in industrial applications, are susceptible to a variety of defects, including sensor failures, component degradation, and control system mistakes. If these flaws are not recognised and remedied immediately, they can cause system instability, decreased efficiency, or even catastrophic failures. This study offers improved fault detection approaches in electric drives, with a focus on identifying defects in critical components such as current sensors, power electronic converters, and electric motors. The methods discussed include model-based, signal processing, and machine learning approaches, each with unique advantages in terms of sensitivity, accuracy, and computational complexity. The study also discusses fault-tolerant control solutions that allow the drive system to continue running.

641.IOT-BASED LORA-ENABLED SAFETY MONITORING SYSTEM FOR COAL MINING WORKERS

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The safety of mine workers continues to be a major concern due to the hazardous underground environment. Workers are frequently exposed to harmful gases, smoke, and poor air quality, which can cause serious health problems and even life threatening accidents. Therefore, developing a reliable and real-time monitoring system is essential to ensure both worker safety and improved mining operations. This paper presents an Internet of Things-based mine safety monitoring system designed to continuously monitor environmental conditions inside underground mines. The proposed system comprises two main components: a miner-side monitoring unit and a central monitoring unit. The miner-side unit is equipped with smoke sensors and semiconductor-based gas sensors to detect hazardous gases such as sulphur dioxide, nitrogen dioxide, and carbon monoxide. These sensors continuously measure the concentration levels of smoke and toxic gases in real time, enabling early detection of dangerous conditions and enhancing worker safety. A microcontroller processes the collected data and compares it with predefined safety limits. If the gas or smoke levels exceed the safe threshold, an immediate alert is given to the worker through a buzzer. At the same time, the data is transmitted to the central monitoring station using LoRaWAN technology, which supports long-range and low-power communication suitable for underground mining environments. The received data is then uploaded to a web-based IoT platform, allowing supervisors to monitor conditions remotely and take timely action if necessary. By providing early warnings and continuous environmental monitoring, the proposed system helps reduce risks, improve response time during emergencies, and enhance overall mine safety. The system is cost-effective, energy-efficient, and scalable, making it a practical solution for modern smart mining applications.

642.DECENTRALIZED BLOCKCHAIN-BASED FUND MANAGEMENT SYSTEM FOR TRANSPARENT AND SECURE MEDICAL TRANSACTIONS

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This research presents an integrated blockchain-driven healthcare management system with a combination of Ethereum smart contract, Medical data storage system based on IPFS and Django-web3 interaction layer for secure patient record management, transparent tracking of donations and doctor authentication system. The

system implements a Solidity contract for patient, doctor, donor, insurance balance and withdrawal management and tampering of storage, and medical workflows are auditable. A Django backend that interfaces with the services of this blockchain using Web3.py therefore allows the retrieval of on chain states in real-time, timestamp normalization and donation analytics as well as the linking of patients to doctors and acts as a user-facing application layer. The platform overcomes old problems like centralized data breach, unverified fund utilization, and trust deficit in medical charities by imposing cryptographic immutability, automatic record keeping and role based interactions. The architecture is proof of a scalable, transparent and secure model that we can use for decentralized networks for healthcare finance, insurance reimbursement and medical aid distribution.

643.DESIGN OF HIGH GAIN WEARABLE VIVALDI ANTENNA FOR BIOMEDICAL APPLICATIONS

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Current studies in biomedical application have highlighted the importance of wide-band and directional antennas for achieving reliable imaging performance. The existing antenna provides good imaging accuracy, but their large size and rigid structure limit their suitability for compact biomedical systems. In this work, the design and simulation of a compact Vivaldi antenna is presented as an alternative approach for biomedical applications. The proposed antenna features a planar geometry with an overall length of 110 mm and a height of 80 mm, incorporating a 24 mm circular feed transition, a 20 mm feed gap, and a smoothly tapered slot expanding to 40 mm with a 30 mm flare length to support stable end-fire radiation. The antenna is designed to operate over an ultra-wideband frequency range from 1.62 GHz to 3 GHz, centered at 2.4 GHz. Simulation results obtained using HFSS demonstrate good impedance matching with S11 below -10 dB, VSWR less than 2, and a peak gain of approximately 6.2 dB. The results indicate that the proposed antenna provides a compact and efficient alternative to bulky antenna arrays biomedical application.

644.AGENTIC AI IN QUICK DIGITAL COMMERCE: A REVIEW AND RESEARCH OUTLOOK

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Quick Digital Commerce has emerged as a response to growing consumer demand for ultra-fast and reliable delivery services, particularly in dense urban environments. Unlike traditional e-commerce models that rely on centralized warehouses and longer fulfillment cycles, quick commerce operates under strict time constraints, decentralized inventories, and highly dynamic demand patterns. These conditions place significant pressure on conventional artificial intelligence systems, which are often centralized, task-specific, and limited in real-time adaptability. This paper presents a comprehensive review of the evolution from traditional digital commerce to Quick Digital Commerce, with a focused examination of the role of Agentic Artificial Intelligence in addressing

operational complexity. Agentic AI is characterized by autonomous, goal-oriented agents capable of perception, reasoning, learning, and coordinated action. The study analyzes how agentic systems can improve decision-making across inventory management, pricing, logistics, and customer interaction through decentralized and real-time coordination. Existing literature on agent-based models, multi-agent architectures, and AI-driven commerce platforms is systematically reviewed to identify performance benefits, architectural patterns, and reported limitations. Key challenges such as explainability, ethical risks, real-time learning stability, and the lack of standardized benchmarks are also discussed. Finally, the paper outlines future research directions, including multimodal agents, LLM-based agent integration, human-agent collaboration, and simulation-driven training. The findings suggest that Agentic AI represents a foundational paradigm for building scalable, resilient, and intelligent Quick Digital Commerce systems.

645.IOT-ENABLED SMART SERVICE AND PRODUCT MANAGEMENT SYSTEM

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The main issues in the modern product based service processes are transparency, safety, and efficient functioning. Here, the current paper presents an integrated Internet of Things (IoT) service and product-management platform that comprises a customer-care module, job-support staff aids, administrative controls, and real-time impact detection, all integrated into one unified platform. The system includes a web portal to book orders for customers, an employee portal that provides the functionality to execute assigned tasks and monitor their execution and performance, and an administrative console that also provides human resource management, task assignments, and policy management. The technical components of the framework use an ESP32 microcontroller and an MPU6050 Inertial Measurement Unit (IMU) with an accelerometer and gyroscope to identify product falls and impact. The sensor data is then processed through an algorithm based on a threshold in order to isolate actionable events. When detected, the processed data is sent to a backend server, which triggers automated actions such as sending notifications to interested parties and the establishment of the replacement or refund operations. It is anticipated that the suggested system will provide the requested stability, further expand deployability, increase reliability, accountability, and decision-making, and ensure secure data transmission.

646.A DIGITAL TWIN DRIVEN EXPERIMENTAL FRAMEWORK FOR BEHAVIORAL ANOMALY DETECTION IN SMART OFFICE NETWORKS

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Smart office networks increasingly rely on interconnected IoT devices, cloud services, and internal applications to improve workplace automation and productivity. This connectivity brings clear operational benefits, but it also increases the risk of cyber-attacks and behavioral threats. Evaluating intrusion detection tools directly on live production systems can add performance overhead and operational risk. This paper presents CyberTwin, a digital twindriven experimental framework for safe, reproducible, and nonintrusive evaluation of behavioral anomaly detection techniques in smart office environments. A containerized virtual replica of a smart office network is created using Docker. This setup allows for controlled traffic generation, attack simulation, and flow-level feature extraction without affecting physical systems. A Random Forest classifier serves as a reference detection model to examine behavioral differences under controlled attack conditions.

647.MULTI-DISEASE PREDICTION USING CLINICAL BIOMARKERS

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Chronic noncommunicable diseases (NCDs) have grown into a major challenge for both health care systems as well as entire economies; they are becoming more widespread and prevalent throughout the world. In this paper, we propose a comprehensive Multi-Task Learning (MTL) strategy to estimate the risk of four common NCDs: Heart Disease, Stroke, Chronic Kidney Disease (CKD), and Diabetes Mellitus. We present an MTL methodology that utilizes a combination of disparate publicly-available datasets related to cardiovascular health and metabolism; this entails conducting domain-specific harmonization and imputation and extracting latent risk factors via multivariate methods (PCA, ANOVA), then applying a hypothetical MTL predictive model, with individual task-specific predictions from multiple tasks produced by building a single shared bottom deep neural network architecture that has four task-specific heads. In this study, we put particular emphasis on addressing severe class imbalance using an adaptive weighted loss function and detailed stratified cross-validation methodology. The empirical results indicate a high degree (ROC-AUC ≥ 0.91 across all tasks) of discriminative accuracy, support strong F1 scores for all four diseases; thus, the MTL method was effective in producing concurrent estimates of chronic disease risk.

648.REHAWALK: SMART PARALLEL BARS WITH MOTION FEEDBACK FOR THERAPY

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Gait rehabilitation is a crucial component of recovery for patients with stroke, neurological disorders, and orthopedic conditions, yet traditional therapy methods often rely on subjective observation and patient feedback. This lack of objective data limits precision and slows progress assessment. RehaWalk has been developed to address these challenges by integrating affordable sensors and real-time feedback into conventional therapy infrastructure. The system incorporates load cells with HX711 amplifiers for accurate weight distribution, force-sensitive resistors (FSRs) for step detection, and inertial measurement units (IMUs) placed on thighs, ankles, and lower back to capture kinematics. Additional flex sensors and handrail grip sensors provide insight into joint bending and upper-limb support, while optional physiological sensors enable fatigue monitoring. Multiplexers (CD74HC4067 and TCA9548A) were employed to overcome microcontroller pin limitations, allowing scalable integration with Arduino Uno. Data from all sensors are processed in real time to deliver corrective cues through visual and auditory feedback. Experimental validation with healthy volunteers and patients demonstrated significant improvements in step length, walking speed, and weight symmetry, along with reduced postural sway and handrail dependence. High adherence to corrective cues confirmed usability and effectiveness in clinical settings. By combining affordability, adaptability, and robust performance, RehaWalk transforms standard parallel bars into intelligent rehabilitation platforms. Future work will focus on wireless data transmission, machine-learning-based feedback optimization, and tele-rehabilitation support, making the system scalable for diverse healthcare environments.

649. AN AI-POWERED NATURAL LANGUAGE INTERFACE FOR REAL-TIME DATABASE OPERATION

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The skillset required for Structured Query Language has been found to remain an essential factor that acts as a barrier for the non-technical users who might need to utilize the structured data available in the relational database. The use of data-based decision-making has been found to remain a widely accepted factor in the contemporary organisations. However, the skillset required for interacting with the database has been found to remain limited to the users who have the required skillset. This has been found to remain an essential factor that has been leading to organisational dependencies on technical staff, organisational delays, and data availability. An artificial intelligence-based natural language interface has been presented in order to resolve the aforementioned issues, which allows for the interaction of the database through natural language-based queries. The dynamic translation of natural language-based queries has been found to take place in real-time, along with the generation of SQL queries that are context-sensitive, syntactically correct, and have database schema introspection. The safety constraints have been found to be included in the process in order to avoid the devastating database operations. The database columns, as well as tables, are identified in a dynamic manner, the prompts are generated at structure, the queries are generated from prompts, the generated queries undergo a security compliance check, as well as execution through live database instances. The above-mentioned functionality is achieved through various layers with the help of modular architectural design. Scalability, modularity, as well as flexibility concepts are also achieved through the implementation with the help of Python, LangChain, SQLAlchemy, as well as OpenAI and Gemini API. The real-time execution is also validated, whereas the technical demands for database interaction are reduced through experimental validation. The above-mentioned methodology is also applicable to various fields such as business analytics, education, health, as well as research fields. The solution obtained is an efficient, safe, as well as an intuitively engaging way of interaction with the database through natural language-based interface.

650. PERSON RE-IDENTIFICATION USING DEEP LEARNING

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Machine learning is an inclusive term and a significant subset of it is currently known as deep learning and it applies neural networks. The purpose of these networks is to mimic learning in the brain although they remain inferior to the capabilities of the human brain. Individual ReIdentification (ReID) is one of the new uses that can be used to monitor an individual across a series of cameras. Nevertheless, this task is rather complicated by such issues as occlusion, different camera angles, and human posture change. One of the major challenges in ReID is the spatial mismatch of image pairs due to the varying viewpoint and the location of the pedestrians. In an attempt to address these concerns, scholars have considered Convolutional Neural Networks (CNNs) in

conjunction with reinforcement learning. The approach trains image pairs with a given spatial correspondence by studying local pairwise interactions, and thus, it is a good approach to ReID. CNNs are effective image recognition, classification, and computer vision and they are very accurate, more so when a large dataset is utilized. In a CNN, the object features are recognized and learned as the data flows through the layers of the network in various repetitions. As an example, the method has an accuracy score of 96.0 and 89.0 as compared to currently available methods. The best way to get to know whether various techniques are effective is by looking at some of the most frequently used datasets, and assessing the strengths and weaknesses of various approaches and how the algorithms perform on fresh image datasets. In this manner, the researchers will be able to train deep learning models on facial recognition based on the newly obtained images of CNNs, thereby contributing to the accuracy and increased reliability of the ReID systems in general.

651.DESIGN AND IMPLEMENTATION OF AN ECONOMICAL SOLAR WATER PUMP WITH GRID AND BATTERY BACKUP FOR CONTINUOUS OPERATION USING ANN CONTROLLER

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The growth of agricultural and rural water needs which require a more reliable and sustainable supply of water has promoted the development of solar-powered water pumping systems. Nevertheless, the variability of solar energy restricts round-the-clock functionality and the use of systems. This paper introduces an extension-based design and analysis of a cost effective solar powered water pumping system with grid and battery backup to make it operational at all times. The reason behind the use of a switched reluctance motor (SRM) drive is its simplicity of design, high reliability, and compliance with adverse operating conditions. An Artificial Neural Network (ANN) controller is also used to implement intelligent power and motor control so as to optimize the performance of the system to operate in different solar irradiance and load conditions. The proposed setup does not require the use of a DC-DC MPPT converter hence, simplifying the system, minimizing its costs and power

wastage. It has a grid-connected voltage source converter at the point of common coupling to ensure quality power and minimize harmonic distortion at the point of common coupling. MATLAB/Simulink is used to validate the overall system performance and it is found that the system will be more reliable, will have better quality of power and will also use less energy as compared to the conventional solar water pumping systems. The findings verify that the suggested extension design is a cost-efficient and sustainable solution to continuous application of agricultural water pumps.

652.NURTURE MONITOR A CONTACTLESS MULTI-SENSOR EMBEDDED SYSTEM FOR EARLY DETECTION OF SIDS RISK FACTORS

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Sudden Infant Death Syndrome (SIDS) is still one of the prime concerns for unexplained infant deaths occurring during their sleep, where the development of risk factors passes unnoticed. Hence, it is essential to have continuous physiological, behavioral, and environmental monitoring infant. The paper introduces a non-contact, multi-sensor embedded system for SIDS risk factors. Our work utilizes mmWave-based respiration sensing, acoustic sensing, vision-based infant posture recognition, non-contact infant body temperature measurement, along with environmental sensing, implemented on the Raspberry Pi Pico-W. This approach through decision-level sensor fusion prevents babies from having early warning alerts through wearable devices. The controlled environment experiments focus on stable infant monitoring without increasing false alarms, prioritizing early infant risk alerting rather than infant diagnosis.

653.A SOLAR POWERED UNDERWATER INDUCTIVE WIRELESS POWER TRANSFER SYSTEM IN MARINE APPLICATION

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In marine ecosystems and underwater missions, the rise in demand for efficient and clean energy usage has contributed to novel forms of energy delivery. Batteries and tethered cables, dominantly wired and tethered, are marred with corrosion and mechanical issues and frequent upkeep. This paper proposes a solar-powered underwater inductive wireless power transfer system to overcome the described issues. Contactless power transmission in combination with renewable energy is generated to address the connectivity issues of underwater devices. The system to be tested, includes a solar energy harvesting unit to management circuitry and a wireless inductive coupling setup built to transfer power through water. The system performance is tested under differing conditions including coil alignment, water conductivity and load, etc. Abnormal primary system operations are guarded, and power delivery is controlled under system defined conditions. This solution minimizes device maintenance underwater and ensures uninterrupted operation.

654.DEVELOPING A TRANSPARENT ANEMIA PREDICTION MODEL EMPOWERED WITH EXPLAINABLE ARTIFICIAL INTELLIGENCE

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This is because the prevalence of anemia all over the world requires solid, convenient, and precise diagnostic tools that enable early intervention to achieve better results to a patient. Although effective, traditional clinical measures may be associated with issues related to resource constraints, inconsistency of diagnostic requirements. In the recent past, machine learning (ML) models have shown significant effectiveness in disease forecasting, but the application of complex algorithms as black-boxes to clinical applications is hampered by the fact that these algorithms are not as transparent as they should be. deficiency in openness in decision making. This paper will close the existing gap between predictive performance and clinical interpretability. suggests a Transparent Anemia Prediction System with the power of Explainable Artificial Intelligence (XAI). The proposed model uses the Extreme Gradient Boosting (XGBoost) algorithm, which is trained on the most important hematological parameters Hemoglobin, MCH, MCHC, MCV, and Gender- to accurately predict anemia. We combine in order to overcome the transparency challenge. SHapley Additive exPlanations (SHAP) to give both global model information and local and patientcentric explanations. This allows healthcare providers to learn the particular contribution of each parameter of the blood to a diagnosis, and build trust in

automated systems. It is shown that the proposed model has a better accuracy of 98.13% with a lower value of a minimal missrate of 1.87%. XAI implementation creates a new paradigm of hematological diagnosis, which is a solution. Not only that, but also clinically interpretable and transparent.

655.GEO-FENCED EV CHARGING SYSTEM USING IOT

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The growing trend of electric vehicles (EVs) requires the development of secure, efficient, and automated charging systems. The current EV charging system setup involves the use of traditional authentication systems such as RFID tags, QR codes, and mobile apps. However, current systems are still open to unauthorized bookings and improper use because they do not check the user's location. To overcome this problem, this paper presents a geo-fenced, OTP-secured electric vehicle (EV) charging system using Internet of Things (IoT) technology. The proposed system combines wireless and wired charging systems, GPS location verification, and OTP-based access control. The proposed system also monitors the State of Charge (SoC) of the EV battery and automatically suggests nearby geo-fenced charging stations when the SoC level goes below a certain threshold. Access to charging is granted only after successful verification of the OTP and the EV's presence within the geo-fenced region. In addition, the charging system uses an inductive coil for enabling wireless power transfer. Data synchronization and session logging are performed through a cloud platform to enable real-time monitoring and authentication. The proposed system is tested through experimental results that show its effectiveness in providing secure access control, proper geo-fencing, and real time monitoring for smart city EV applications. The system also tracks the battery condition continuously using a NodeMCU and voltage sensor, while the GPS module is used to obtain the location coordinates.

656.AN ADAPTIVE SPATIOTEMPORAL MULTIMODAL FUSION FRAMEWORK WITH CONTEXTUAL SEMANTIC RECONSTRUCTION FOR ASSISTIVE COMMUNICATION

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Communication barriers among individuals with sensory and speech impairments continue because of the disjointed nature of the current assistive technologies. These technologies often work only in isolated modes like sign language recognition or speech processing. This paper proposes a spatiotemporal multimodal fusion framework with the potential for adaptive semantic reconstruction of the context for an inclusive assistive communication system. The system combines vision-based gesture recognition, speech processing, natural language modeling and haptic feedback, which together form a realtime inference pipeline. A spatiotemporal learning model based on adaptive landmark detecting recognizes that a dynamic sign gesture is composed of a series of relationships between the spatial keypoints as well as the temporal dependencies of those features. An adaptive fusion method merges visual, speech and textual embeddings through the use of weights learned via backpropagation to increase robustness. Furthermore, a context-dependent semantic reconstruction module can generate a grammatically correct sentence and a meaningful one that is accurate even at the word level. Emotion-aware classification also enhances the ability of the model to respond appropriately in situations that are sensitive or critical. Moreover, the system enables an adaptive choice based on user preferences and environmental factors for the mode of communication, text, speech or haptic feedback, with the possibility of offline performance for situations that lack resources. The experimental results indicate that the model exhibits enhanced accuracy (93.8%) and latency reduction over the state-of-the-art models, thus it can serve as an effective platform for scalable inclusive human-computer interaction.

657.WOMEN SAFETY APPLICATION: REAL-TIME VOICE ANALYSIS FOR EMERGENCY RESPONSE

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The identification of emergency situations at an early stage is essential for effective intervention and the safety of women in vulnerable settings. Conventional safety systems depend on manual triggering, delayed responses, or the intervention of a third party, which may not be effective in critical situations. There is a growing trend of research that suggests distress, panic, and fear are expressed in specific voice patterns and acoustic variations that can be analyzed computationally. The objective of this research is to design an automated women safety system based on real-time voice analysis and deep-derived features from speech signals. It proposes a simple and effective method for applying deep learning algorithms to identify emergency situations using voice patterns. The result of this research work proves to be reliable and efficient compared to conventional rule-based and threshold-based safety systems. This finding validates the assumption that deep learning algorithms-based voice analysis systems can be used as intelligent supporting systems for emergency detection and response. Observations based on a carefully selected voice dataset show that the proposed system has high accuracy, precision, and sensitivity compared to conventional machine learning algorithms like SVM and RF.

658.FABRICATION AND TESTING OF SOLAR POWERED WATER AND AIR PURIFIER

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Access to clean water and breathable air is essential for human health, yet many regions face challenges due to pollution and energy scarcity. This paper presents the fabrication and testing of a solar-powered water and air purification system designed to provide an ecofriendly and energy-efficient solution. The system utilizes solar photovoltaic panels as the primary power source, eliminating dependence on conventional electricity. The water purification unit employs a combination of sediment filtration, pre filter to remove suspended particles, harmful microorganisms, and odors. The air purification unit integrates pre-filters and HEPA filter to reduce dust, smoke, and airborne contaminants.

659.IOT-BASED PATIENT HEALTH MONITORING SYSTEM FOR HOSPITALS AND REMOTE AREAS

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Continuous remote monitoring of patients with IoT technologies does not work well in low-connectivity environments. Thus, this project is focused on developing a completely offline patient-monitoring system that incorporates all three functionalities: (1) Vital signs detection, (2) Fall detection, (3) Alerts via GPS/GSM technology. The developed prototype consisted of the following sensors: MAX30102 and DS18B20 for Vital Signs detection, and MPU6050 for Fall detection. The ESP32 is the main controller for processing the data and determining the thresholds. Testing of the developed prototype has demonstrated reliable fall detection with fast SMS alerts, as well as being unaffected by weak network connectivity. Modular RTOS task organization supports parallel operation of sensor acquisition, signal processing, alert management, communication handling, and power optimization, forming a stable and deterministic firmware architecture. This developed solution represents a compact, low-cost option to enhance the safety of patients and the ability to respond to emergencies in rural health care settings.

660. FABRICATION OF VOICE CONTROL WHEELCHAIR FOR PHYSICALLY DISABLED PEOPLE

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Mobility assistance is essential for individuals with physical disabilities, particularly those who experience difficulty in operating conventional wheelchairs. This paper presents the fabrication of a voice-controlled wheelchair intended to enhance mobility and autonomy for physically disabled people. The proposed system employs a voice recognition module to interpret predefined voice commands such as forward, backward, left, right, and stop. These commands are processed by a microcontroller. The design focuses on simplicity, low cost,

and ease of operation making the system suitable for users. Experimental testing of the fabricated prototype demonstrates accurate command recognition and smooth operation under normal working conditions.

661.REAL-TIME FACIAL EXPRESSION RECOGNITION USING A HYBRID YOLOV8 AND TINY-ViT MODEL

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This paper introduces a real-time facial expression recognition system that combines YOLOv8 for fast face detection with Tiny-ViT for compact emotion classification. The hybrid architecture proposed strikes an effective balance between precision and inference latency, allowing for reliable operation on resource restricted platforms. The system is only trained and tested on a recently created Indian facial expression database consisting of seven emotion labels—happiness, thoughtfulness, anger, surprise, sadness, fear, and excitement—which are photographed in varying illumination settings. Experimental outcomes confirm that the YOLOv8–Tiny-ViT architecture obtains high recognition accuracy and low delay and surpasses traditional convolutional models in both efficiency and robustness. Its compact architecture and real-time performance make the proposed system highly suitable for practical applications in areas like healthcare monitoring, education, human–computer interaction, and intelligent surveillance.

662.EVALUATION OF RE-IDENTIFICATION RISKS AND PRIVACY ENHANCEMENT FRAMEWORKS FOR NATIONAL STATISTICAL MICRODATA

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The National Statistical Office is pushing out far more raw, unit-level microdata to help national research and social innovation thrive, the danger of private individuals getting identified through smart linkage attacks has spiked quite a bit. Old-school, rule-based ways like simple masking just can't keep things safe anymore against modern hackers who use giant piles of public records to unmask folks. This paper breaks down the SafeData pipeline, a strong, flexible tool built just to handle that tough trade-off between data privacy and its actual usefulness. Our system relies on three main pieces: a Risk Assessment tool that runs a custom, high-speed crawler to check current privacy tactics against actual data leaks and metadata; a Privacy Enhancement module that applies Differential Privacy and Synthetic Data Generation to put real security into the datasets; and a Utility Measurement unit to make sure the final data stays good for real academic work and policy needs. Our findings show that the SafeData setup drops these risks to almost nothing without hurting the accuracy of the social stats. As a result, this tech gives government groups an easy way to stay in line with the rules in the Digital Personal Data Protection Act, passed in 2023.

663.PHARMALEDGER: A DECENTRALISED DRUG TRACEABILITY AND COMPLIANCE FRAMEWORK USING BLOCKCHAIN

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Fake drugs continue to pose a significant global healthcare issue, as they have led to significant concerns including deaths of patients, ineffective treatment and cash losses and even loss of credibility in the drug delivery chains. The traditional centralized systems are opaque, easily breached, and lack end-to-end visibility of the lifecycle of the drug, between manufacturing and dispensing. In a bid to address such weaknesses, this paper proposes PharmaLedger, a pharmaceutical supply chain monitoring and validation system which relies on blockchain technology to ensure authenticity, immutability, and transparency of drug transfer. The system involves the cryptography hashing functions of SHA-256, decentralized Ethereum smart contracts, role based secure access, and QR code validation to develop a credible and verifiable pharmaceutical distribution ledger. PharmaLedger has been deployed on the management of flask backend, SQLite, metadata stored in a structured form, and a custom blockchain ledger to ensure the transaction is stored in a non-manipulative form. Each supply chain event such as manufacturing, shipping, distribution and final pharmacy delivery will be cryptographically chained and logged ensuring that in the event of any attempt to alter or add fraudulent records, these will be easily noticed. QR codes scanning can help consumers and stakeholders to determine whether medicines are genuine or not and provide live evidence of medicine verification. The created system has enormous potential in the combat against counterfeit drugs and introduces the scalability, transparency and real-world deployment in healthcare ecosystems.

664.MACHINE-LEARNING-ASSISTED HYBRID ACTIVE AND PASSIVE NOISE CONTROL BARRIER FOR URBAN NOISE SUPPRESSION

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City noise pollution has become one of the most topical environmental issues of the 21 st century, which affects the health of the population, the quality of life, and the productivity of the economy in the cities of the world to a significant extent. The conventional methods of noise control that are mostly based on passive barriers like sound walls and acoustic panels have shown their inability to deal with the complexity, multi-spectral and dynamic characteristics of noise in urban areas. This study introduces a new machine-learning-assisted hybrid active and passive noise control barrier system based on an entirely new application as an overall urban noise suppressor. The suggested system combines some of the latest passive acoustic materials with the latest active noise control (ANC) technologies, and coordinated by intelligent machine learning algorithms that can respond to environmental changes and optimize in real-time. The hybrid architecture integrates both the natural broadband attenuation behavior of designed passive components and the selective and accurate frequency cancellation properties of the active control systems in a well coordinated effort to accommodate both the lower frequency and upper frequency noise elements. The passive part of the system includes multi-layered acoustic barriers with novel metamaterial designs, porous absorption substances, and resonant panel designs in optimal arrangement to the noise frequencies of urban environments. These elements have essential noise-reduction and absorption, reflection and diffraction processes, which create a minimum level of acoustic protection and form a structural base to active elements. The passive design employs a complex computational acoustic modeling to achieve optimum material choice, thickness distribution and geometry to ensure maximum efficiency over the normal urban noise frequency bands, specifically to areas of transportation sound such as vehicular traffic noise, railway and aircraft noise. The active noise control subsystem uses distributed arrays of high-performance microphones, accelerator, and loudspeaker actuators, which are distributed all over the barrier structure. The network allows you to fully monitor the noise fields in an incident and create accurately calibrated anti-phase acoustic signal to create destructive interference. The ANC system employs superior adaptive filtering algorithms, such as filtered-x least mean squares (FxLMS), recursive least squares (RLS), and new neural network-based methods in order to obtain the best noise cancellation performance in different environmental conditions. The machine learning framework is the central novelty of the study that introduces advanced

algorithms to optimize the work of a specific system in real-time and achieve adaptive control. Deep learning systems, such as convolutional neural networks (CNNs) to recognize noise patterns, recurrent neural networks (RNNs) to predict short-term temporal signals, and reinforcement learning agents to optimize the control strategies have the ability to cooperate in order to optimize the effectiveness of the noise reduction systems and reduce the energy consumption and complexity of the system. The ML algorithms continuously assess the acoustic environment, forecast the noise patterns, determine the best control parameters and adjust the system response in accordance with the changing conditions such as weather conditions, traffic patterns, and acoustic propagation characteristics. The proposed system was validated through experimental studies by laboratory tests and field tests controlled in real urban settings. Experiments carried out in laboratories using anechoic and reverberant chamber facilities showed a large improvement in noise reduction performance relative to traditional passive barrier and stand alone active control systems. The hybrid system attained an average noise reduction of 25-35 dB in the broadband frequencies as well as reaching a maximum of over 45 dB in the critical frequency bands which are normally linked with noise sources in the urban environment. Field testing campaigns were carried out in various urban sites such as highways, railroads and commercial districts where mixed-use was made with mixed-use commercial districts undergoing real-world testing of system performance in a wide range of acoustic conditions. Findings showed robust noise reduction capabilities in the different environmental parameters and the machine learning models were shown to adapt to the local acoustic properties, temporal noise dynamics, and seasonal changes. The system was especially effective in combating intermittent sources of noise like emergency vehicles, construction projects and aircraft flyovers, which are normally difficult to deal with using traditional methods of noise control. The analysis of the performance showed that the hybrid approach with the help of machine-learning had a number of major advantages. The combination of passive and active components offered strong noise control over wide frequency bands, which are similar to the shortcomings of specific technologies. Passive components were very effective in removing noise at mid and high frequencies and gave the structure the stability of the system and active control systems can specifically remove low-frequency components which generally penetrate conventional walls. The optimization of the machine learning kept the parameters of the system in a continuous refinement, which is why the system had the adaptive performance, which was improved during the course of time due to the gained experience in the environment. The analysis of energy efficiency showed that it is much better than traditional active noise control systems, and machine learning algorithms are used to optimize the use of actuators and minimize unnecessary energy consumption in the moments of low noise activity. Predictive capabilities of the ML system allowed the proactive control strategies; noise events were anticipated and the system responses were pre-placed to be as effective as possible. The method also led to 40-60 percent saving in energy use over traditional reactive ANC systems and the best noise reduction performance. Cost-benefit studies on large-scale urban implementation showed good cost-benefit ratios, especially in urban high-population regions where noise pollution has a strong effect on property values and healthcare costs of people. The proposed system has a modular structure which allows it to be implemented in a progressive manner with the ability to scale-up and scale-down as per the requirements of the urban planning and the availability of budget. Lifecycle cost analysis proved to have competitive advantages over the expansion of passive barrier installations especially on the factors of maintenance, land use effectiveness, and the factors of long-term performance degradation. Environmental assessment reports validated the sustainability advantages of the suggested solution such as less material consumption than large scale passive barriers, less carbon footprint through efficient energy use, and less visual impact through small scale designs that are easily customized aesthetically. The fact that the system can be effective through the long periods of operation without a significant decline in performance can be considered a great improvement compared to traditional methods when maintenance and replacement of the system had to be regularly performed. The implementation issues covered by the research were weather resistance, system reliability and how the system fit with the existing urban infrastructure. State of the art materials and designs guarantee operation effectiveness in all types of climatic conditions and redundant sensor networks and fault tolerant control algorithms allow the systems to continue working even when components failed. The unified interfaces and communication standards allow an easy integration process using the smart city infrastructure and the current noise monitoring networks. Future opportunities are to expand machine learning to support more developed deep learning models, to connect to IoT sensor networks in managing noise in the entire city, and to develop self-healing materials to support longer life of the system. The possibility of the integration of new technologies, namely quantum sensors, metamaterials innovations, and distributed AI processing are potentially more beneficial in terms of performance and the possibility of further application.

665.HEARTFORMER A LIGHTWEIGHT TRANSFORMER FOR ECG CLASSIFICATION

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The monitoring of heart abnormalities by electrocardiogram (ECG) signals is of critical importance in the first steps of detecting such issues at the earliest stages available, but the available solutions are usually based on expensive hardware and computationally-heavy models. This article presents HeartFormer, a small Transformer-based architecture the author created to classify ECG in real-time on resource-sensitive and low-cost IoT devices. BioAmp EXG Pill and a wirelessly connected to the ThingSpeak cloud are connected to the ECG signals and remotely read on recorders. human The ECG signals are obtained through BioAmp EXG Pill and a connected wirelessly to the ThingSpeak cloud that will be monitored with recorders. Preprocessing and feature extraction are enhanced through MATLAB algorithms to enhance the signal quality before the signal is classified by an optimized Transformer architecture using limited memory and power. A 3D heart imaging module generates a visualization and improves usability and interpretability even further. The postulated system shows that it has a high classification accuracy with a low latency at a low energy consumption. HeartFormer demonstrates the potential of scalable telehealth in remote, rural, and under-resource medical settings using advanced AI- driven, mobile-sized, and cost-effective cardiac diagnostic tools.

666.ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING–BASED DISEASE PREDICTION AND PERSONALIZED DIET RECOMMENDATION SYSTEMS: A SYSTEMATIC REVIEW

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The rising number of chronic and lifestyle-related diseases has heightened the need to have smart, individualized healthcare solutions especially in the fields of preventing diseases and controlling what one eats. Traditional eating prescriptions are mostly broad-based and do not reflect the variability unique to the individual with regard to health condition, living ways and disease susceptibility. Over the past years, artificial intelligence (AI) and machine learning (ML) methods have become such a potent tool to studying complex healthcare data and providing personalized decision support. This is a systematic review of the recent developments in AI- and ML-driven disease prediction systems and customized diet recommendations systems. IEEE Xplore, SpringerLink, Elsevier ScienceDirect, MDPI were used to obtain 21 peer-reviewed research papers published between 2022 and 2025 with the help of a structured selection methodology. The analyzed reviewed studies included algorithmic methods, datasets, evaluation measures, personalization methods, and system integration.

It is demonstrated that traditional machine learning systems and deep learning systems have high predictive accuracy when it comes to disease risk assessment, and integrated systems based on disease prediction and dietary recommendations have a higher clinical value as they translate predictions into actionable interventions. Nevertheless, the current studies are limited in terms of focus on a single disease, insufficient variety of datasets, lack of explanation, and difficulty in deploying in practice. This review determines the main gaps in research

and provides a perspective into the future to explainable, multi-disease, and patient-centered AI-based nutrition systems to be used in clinical and population health settings.

667.GENETIC RISK FACTOR IDENTIFICATION

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Accurate identification of clinical and genetic risk factors is critical for the assessment of breast cancer risk, thereby aiding the decision-making process in medicine. In the present study, the development of a clinical decision support system, implemented as a web-based platform, for the assessment of breast cancer risk based on clinical, hormone receptor, and genetic risk factors, including BRCA1, BRCA2, and TP53, is presented. In the proposed system, the risk assessment of breast cancer patients is carried out by the supervised machine learning classifier, and anomaly detection in the patient profile is performed by the autoencoder-based neural network. SHAP based Explainable Artificial Intelligence (XAI) is implemented for the assessment of the contribution of individual features towards the final decision of the system, thereby aiding the decision-making process. The proposed system, implemented as a Python-based platform, utilizes the Flask, TensorFlow/Keras, and Scikit-Learn libraries, thereby aiding the identification of genetic risk factors in the assessment of breast cancer risk.

668.REALISTIC AI-GENERATED CONTENT DETECTION AND CLASSIFICATION

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Examples such as ChatGPT, GPT-4 and Claude, among others, are the largest language models that have significantly expanded machine-generated text on the Internet. The issue of separating human and automated generation is very difficult, especially in legal material and news media. In this study, the authors present a detection system based on domain-adaptive pretraining on SEC-EDGAR legal corpora and supervised fine-tuning of DistilGPT-2 to binary classification problems. The experimental pipeline includes detailed

preprocessing procedures, balanced data set creation (1,863 samples including 978 AI-created, 885 manually created in legal contracts and news articles), and interpretability (SHAP and LIME). The untrained DistilGPT-2 Baseline evaluation shows that the accuracy of the untrained DistilGPT-2 is approximately 50 percent, which is at the same level as random classification. After the domain-adaptive pretraining and task-specific fine tuning the model achieved a detection accuracy of 98.6%, a precision of 99.0%, a recall of 98.5% and a F1-score of 98.6%. This architecture provides a solid approach to the problem of content authentication in the world of generative AI.

669.REAL-TIME MULTI-AGENT EXERCISE MONITORING WITH VOICE-GUIDED FEEDBACK

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The healthcare field of physical rehabilitation is shifting from traditional human supervision to autonomous monitoring systems capable of providing high-quality feedback in the home. While markerless posture estimation is one of the initial data streams necessary for this change, understanding remains a significant challenge. Early automated systems used hard-coded logic that failed to adapt to the complexities of human disease and the numerous safety constraints related to different ortho therapies. Meanwhile, the current integration of Large Language Models (LLMs) into healthcare has led to the issue of hallucination, in which models excel at semantic medical reasoning but fail with basic arithmetic required for the joint angle computation. In order to bridge this gap, a distributed multi-agent swarm architecture is carefully evaluated. The system achieves low latency and high accuracy by dividing tasks into specialized agents (Vision, Medical, and Form) and utilizing a symbolic-deterministic hybrid pipeline. The use of skill-based agent integration, which replaces strict codebases with flexible, text-based knowledge files, is critical to this approach because it allows the system to dynamically adapt to new exercises and patient histories without requiring retraining.

670.REAL-TIME LOAD VARIATION MONITORING AND OVERLOAD ALERT SYSTEM USING IOT

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On-site electrical load control has also been regarded as a growing concern in the aspect of providing safety in operation and enhancing energy efficiency within the residential and small scale industrial setting. Traditional protection systems like circuit breakers use only serious overload to act and fail to provide real-time monitoring and control at a distance. The latest innovation in Internet of Things (IoT) technologies has allowed the development of smart monitoring systems that can transmit real-time electrical data to cloud computing platforms to conduct central supervision. The paper describes a Real-Time Load Monitoring and Overload Alert System which is based on ESP32 microcontroller and ACS712 current sensor. The system that is proposed constantly measures load current and determines operating conditions as normal and overload based on a pre-determined threshold strategy. Data is relayed in real time, through Wi-Fi to a backend server and displayed in a dashboard using a web interface. The proposed model is practical, less costly, scalable load supervision than the traditional fault-centric monitoring systems that are suitable to the distributed IoT implementation. The experimental validation proves the stable functionality, good communication, and correct overload display in the changing load conditions. The proposed architecture can be used to support the smart energy monitoring research as it provides a modular, cost-efficient, and deployable solution in accordance with the current IoT-based systems of electrical monitoring.

671.A MULTI-MODEL AI FRAMEWORK FOR EARLY DISEASE DETECTION USING SYMPTOM ANALYSIS AND MEDICAL IMAGE CLASSIFICATION

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The integration of artificial intelligence (AI) into healthcare has revolutionized disease prediction and diagnosis, particularly through the fusion of heterogeneous data modalities. This research paper explores the design and evaluation of a multimodal AI-based early disease prediction system capable of leveraging clinical numerical values, patient-reported symptoms, and medical imaging for the detection of diseases such as diabetes, heart disease, and pneumonia. We review the literature on multimodal data fusion and deep learning architectures, discuss preprocessing pipelines, and address performance evaluation metrics. The paper also examines the comparative advantages of multimodal versus unimodal models. Our proposed system architecture draws upon established best practices in multimodal AI, informed by recent advances in neural networks and fusion strategies. The results highlight the promise of multimodal approaches in improving early disease detection accuracy, robustness, and interpretability, while also outlining future directions for research and clinical integration.

672.UNDERWATER NAVIGATION SYSTEM USING SENSOR FUSION AND MACHINE LEARNING

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Poor visibility, high light absorption, distortion of colour and natural and man-made barriers that are inherent to underwater navigation make navigation difficult. In this paper, I will introduce a vision-based obstacle detection system that will be applied to create a real-time underwater navigation assistance system that is capable of operating on an embedded system. The suggested system will base its detection system on a modified YOLOv12 object-detection framework, using an ESP32-CAM module, to identify and categorize the typical underwater hazards that can cause collision to divers and autonomous underwater vehicles. The categories of the targeted objects are a waste of debris and dangerous objects like masks, cans, cell phones, electronic waste, and glass bottles, gloves, metals, fishing nets, plastic bags, plastic bottles, rods, sunglasses, tires and miscellaneous objects. In order to solve the visual deterioration of underwater images, captured image frames are processed in advance with the help of colour correction, contrast enhancement, and noise reduction images. An individualized YOLOv12 model is trained with an underwater dataset on a labelled case to do an effective object localization and classification. Since computational and memory resources of ESP32 platform are limited, model compression and lightweight inference optimization are used to have an opportunity to deploy edges in real-time mode. The information about the detected obstacles is processed further to produce proximity-based navigation guidance cues, which give necessary information in time to ensure safety and increased awareness of the situation in underwater operations. Experimental findings indicate that the object detection application of deep learning can be scaled down to embedded systems with low resource use and low cost so that it can be deployed in an underwater setting. The suggested system is scalable, energy-efficient, and cost-effective, and can be applied to efficiently detect obstacles underwater, which can be used in the safety of divers, underwater robotics, environmental monitoring, and autonomous navigation systems.

673.CDNA-CSS : A CHAOTIC DNA CRYPTOGRAPH ARCHITECTURE FOR CLOUD COMPUTING SECURITY BASED ON SPLITTING AND COMPRESSION

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The Chaotic DNA Cryptograph of Cloud Computing Security with Splitting and Compression (CDNACSSA) project presents a secure security system in securing the media files which include images and audio files stored in cloud computing infrastructures. The system makes use of Chaotic DNA Cryptography to blend the chaos of chaotic systems with the complexity of encryption by DNA, as well as provide high resistance to non-authenticated decryption. The methodology includes splitting and compression of files to maximize storage and enhance the transmission of data. An encryption using a Shifted Symmetric Algorithm (SSA) is also used to increase the encryption in yet another level of security. The system has also got a secure access control mechanism, which means that only authorized users can decrypt and access files. CDNACSSA offers secure, efficient and scalable solution to the management of encrypted media files in cloud to guarantee the privacy and integrity of data and efficient storage by integrating the latest encryption technologies with efficient file handling and compression methods.

674.DYNAMIC MULTIPHASE ARCHITECTURE FOR IDENTIFYING AND MITIGATION DDOS ATTACKS IN SDN-BASED FOG-POWERED IOT NETWORKS

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The authors have built a deep ensemble learning structure that introduces Distributed Denial of Service (DDoS) attacks directed at Internet of Things networks. The system works on Stacking Classifier that included Random Forest and Gradient Boosting with Voting Classifier that in turn divides into Logistic Regression Decision Tree and K-Nearest Neighbors and Naive Bayes and AdaBoost and the TPOT Classifier that simply auto-creates a model based on its development and optimization process. The pruning technologies enhance the work of the systems and cut the amount of working requirements. The system examines 80 attributes to the network traffic that comprise of packet length and interarrival period and flag number used in detecting normal traffic and DDoS attacks. Comparisons of the results of the measures (accuracy, precision, recall, F1-score) prove that Stacking (99%), Voting (99%), and AdaBoost (99%), perform better than TPOT (98 percent accuracy). The suggested model will allow organizations to introduce DDoS detection, which will be real-time, and will be able to increase and decrease with the needs of the Internet of Things operating environment with limited resources. The solution delivers hi-tech attack detectors with quality outputs and efficient and safe international of things networks by incorporating improved security and attack resistance.

675.KIDNEY TUMOR IDENTIFICATION FROM CT IMAGES USING AN INTEGRATED 3D CNN AND TRANSFORMER- BASED FRAMEWORK

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It is a highly sensitive task in the treatment of the early stages and the provision of the treatment as the CT scan showed the presence of the tumors in the kidneys. Human hands can screen and categorize kidney tumors, therefore, subject to errors and wastage of time, computerized systems should be incorporated to make sure that the process has been improved to be effective and to achieve better results. The article recommends an efficient architecture of the deep learning i.e. the integration of the Transformer networks with the 3D Convolutional Neural Networks (CNNs) to increase the percentage of kidney tumor detection. The system rests upon the diversity of the available trained models i.e., DenseNet121, ResNet101, VGG19, InceptionV3, GoogleNet and MobileNet, to get features. In order to achieve classification, Fuzzy Neural Network (FNN), and Generalized Fuzzy Neural Network (GFNN) is implemented in a way that it could have been categorized in four classification niche; Cyst, Normal, Stone and tumor under which it would have been classified in four categories.

676.USING LARGE LANGUAGE MODELS AND RETRIEVAL-AUGMENTED GENERATION TO BUILD CHAT-BASED KNOWLEDGE BASES FOR TECHNOLOGY ENTERPRISES

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In the modern enterprise, enormous amounts of heterogeneous internal documents are created including operational manuals, policy guidelines, technical specifications, and procedural records that are the keys to organizational effectiveness and knowledgeable decision-making. Nevertheless, conventional enterprise knowledge management systems have been largely based on keyword-based retrieval techniques that tend to miss out on semantic intent and contextual meaning to achieve incomplete or irrelevant information retrieval, and standalone large language models (LLMs) can generate hallucinated or untrustworthy results not based on authoritative enterprise data sources. In order to overcome these shortcomings, in this paper the author suggests a framework of enterprise knowledge management that combines LLMs with retrieval-augmented generation (RAG) to provide correct and context-aware answers. This system uses dense vector embedding based semantic document retrieval with generative response synthesis to provide outputs based on authoritative internal documents with a modular architecture that incorporates document ingestion pipeline, embedding generation module, similarity search by dense vector database, retriever generable, and conversational user interface. Experimental testing on an enterprise-scale dataset proves the suggested method to be far more effective in improving retrieval relevance and response accuracy in comparison with traditional keyword-based systems and has low latency to use in real-time applications, which confirms a reliable and scalable solution to enterprise knowledge management using retrieval-augmented LLMs that reduces the risk of misinformation and enhances contextualization.

677.A COMBINED ARTIFICIAL INTELLIGENCE SUGGESTION STRUCTURE INCORPORATING YEARS PREDICTION FOR CUSTOMIZED ONLINE SHOPPING

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Personalization in the context of a recommendation system assumes great importance in order to enhance the level of engagement and satisfaction for users in an e-commerce setting. The majority of the conventional methods that have been implemented for a recommendation system are found to be highly dependent on the collaborative filtering approach and the historic interactions of users, while there is a lack of consideration for important demographic factors like age, which play a significant role in influencing consumer behaviour. The proposed study on AI-based recommendation systems includes the implementation of age estimation using deep learning techniques to address the limitations of conventional methods. A Convolutional Neural Network (CNN) model with ResNet-50 is implemented to analyze facial images and classify users based on age groups to obtain demographic information. The calculated age group will then be included in the recommendation engine's model as an additional contextual attribute to improve the accuracy of filtering and quality of personalization. The proposed model combines the power of visual demographic analysis with the conventional methods of a recommendation engine to reduce the need for explicit user information while increasing the accuracy and quality of recommended products. The results of the experimental evaluation demonstrate that the inclusion of age as a predictive attribute increases the precision and perceived relevance of recommended products significantly compared to conventional methods. The proposed system is scalable and automated to provide a solid foundation for creating adaptive and demographically intelligent recommendation systems for e-commerce applications.

678.AN INTELLIGENT SYSTEM-BASED MALICIOUS CODE INTRUSION INTENDED FOR DODGING COMPUTERIZED ALGORITHM-BASED MONITORING ASSOCIATED WITH ELECTRONIC HARDWARE EMBEDDED THREATS

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The high rate of globalization in semiconductor process technology has raised the threat of Hardware Trojan (HT) insertion in modern SoC designs. To defeat the in-scalability of traditional simulation-based detection techniques, machine learning-based Hardware Trojan Detection techniques have found widespread usage. These techniques utilize structural and statistical features extracted from the gate-level netlists of the suspected hardware devices to achieve higher detection efficiency and effectiveness. Though machine learning-based techniques provide enhanced detection efficiency, they have also posed many new security risks due to the lack of trustworthiness of the detection models. This paper proposes a novel AI Trojan backdoor attack framework for attacking ML-based hardware Trojan detectors. The attack strategy relies on the integration of hidden trigger characteristics into the system, which is achieved by developing a two-stage training approach. By doing this, the compromised hardware Trojan detector maintains its baseline accuracy during evaluation, implying the attack is effective for when the attacker-specified trigger is present. Experimental validation reveals the effectiveness of the attack with a high attack success rate, indicating the susceptibility of ML-based hardware Trojan detection systems, which places a significant emphasis on the integrity of the systems being deployed.

679.AUTONOMOUS RF SIGNATURE AND SENSOR-BASED DRONE DETECTION SYSTEM FOR CIVIL ZONES

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The increasing use of drones has raised concerns about the safety of civilian infrastructure, yet conventional security strategies such as radar and jamming are frequently impractical or restricted by legal frameworks like the Indian Telegraph Act. Sensors that depend on a single type of data, such as sound or radio waves, face challenges in urban environments due to high noise levels and poor signal strength. This paper presents a smart system that integrates multiple types of sensors using a "Check and Confirm" strategy. The system first detects movement using low-power motion sensors and then verifies the presence of a drone through sound analysis and patterns in radio signals. The system utilizes a hybrid processing architecture where an Arduino Uno manages real-time sensor data, while a connected host executes a YOLOv8 object detection model for visual verification. Testing with 50 drone flights demonstrated that the combined system significantly improves drone detection, achieving an accuracy rate of 95–97%, which is higher than using sound or radio alone. The system also reduces false alarms by approximately 20% and operates quickly, with an average delay of 356–371 milliseconds. This solution is designed for use on compact devices, ensuring it is legally compliant, efficient, and suitable for securing locations such as airports, sports facilities, and residential areas.

680.MULTIMODAL HARASSMENT AND CYBERATTACK DETECTION IN SOCIAL MEDIA USING CONTEXTUAL AI ENGINES

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Digital communication platforms face increasing challenges in managing cyber harassment. Malicious actors are increasingly bypassing conventional moderation systems by using voice messages, videos, and writing words from different languages in the English alphabet, like Telugu words written in English script. This study introduces SocialSafe-AI, a system that uses multiple types of data to detect and predict cyber harassment and cyberattacks as they happen. The system uses three different AI tools: a specially trained DistilBERT model to understand text meaning, Faster-Whisper to convert speech into text on the device, and NudeNet to perform automated visual safety classification. A new, balanced dataset with 26,000 entries was created to capture the linguistic characteristics of "Telugish," which is the Romanized version of Telugu. These features are usually not considered by most global models. The design uses a parallel and asynchronous system to handle both audio and video data at the same time, allowing it to provide safety inference results in less than 3.5 seconds for media and under 500 milliseconds for text. The evaluation results show that the system can correctly identify sexual harassment and other digital threats such as doxing and sextortion with an accuracy of 84% or higher. SocialSafe-AI works by keeping data on the user's device, which means it fully protects user privacy and reduces infrastructure dependency by eliminating reliance on cloud-based APIs, offering an effective early-stage protection mechanism against risks in today's social media world.

681.SECRASP HIGHPERFORMANCE AND ACCURATE RASP FOR RAPID APPLICATION SECURITY

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This is a high-performance, accurate and system, which will enhance the security of the applications with the implementation of a useful Rapid Application Security Protection (RASP) system. The principal objective of the proposed study is to develop an effective security model which can be applicable to detect and prevent security risks which would ensure safe data and infrastructure. The system applies Support Vector Machine (SVM), the Random Forest, and the XGBoost machine learning algorithms to analyse data related to network traffic, detect anomalies, and assess the degree of threats. The determined characteristics of the suggested system exploit various network traffic related factors to develop an accurate forecast of security threats, where the focus on the most important attributes determines application security. They are the data transfer rates, the response times, the quantities of packets, and the error codes, all of which are required to identify the vulnerabilities and threats. The system will define and detect the potential security violations by training the models with these qualities. The results of the experiment show that Random Forest algorithm is more accurate compared to the other models, as its accuracy is 91.87 with XGBoost at 91.81 and SVM at 83.09 in the second and the third place respectively. It demonstrates that these ensemble learning algorithms as the Random Forest and XGBoost may have a higher level of predictive accuracy to the RASP systems and could be more reliably deployed.

682.AI-POWERED TOOL FOR AUTOMATED PPT SLIDE GENERATION FROM RESEARCH PAPERS

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We all know how hard it is to complete a research and finish it as a research paper, what's even more hard is to find the research paper and extract the perfect content that is needed for us, But, there are millions of research papers out there with similar topics covered. So here our plan is to create a platform where all the researchers could easily find the most important contents in fractions of seconds, Our Slide Genius AI platform generates slides from any type of documents such as PDF's, docx, etc. The system uses document processing and artificial intelligence. The versatility of our platform is truly clean making it suitable for all kinds of audience and it also provides satisfactory outputs This platform greatly benefits researchers, professionals and as well as students of all majors .It also uses FAISS to find vectors really fast. This setup helps the Google Gemini 2.5

Flash LLM make presentation points that're accurate and have no errors. It does this by using something called "Chain-of-Thought" reasoning. The system does not just work with text. It also has a feature that looks at pictures and videos. This feature is really good, at finding pictures, figures and tables. It can even find them based on how clear they're what shape they are. Evaluating 50 papers across five fields demonstrates the system's efficiency

583.SMART PARKING OPTIMIZATION USING REINFORCEMENT LEARNING

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It is a fact that rapid growth in urban populations and vehicle usage has made the task of locating available parking spaces increasingly difficult in metropolitan regions. It not only takes the time of people , but it is also responsible for an increase in traffic levels and fuel consumption, as well as the levels of frustration of people on the roads. Conventional parking systems generally operate on predefined rules and lack the ability to adapt dynamically to changing real-time parking demands. This research work proposes a reinforcement learning-based intelligent parking optimization system for the given issue. A simulated parking situation is established, through which the agent learns by experience to park wisely. It aims to reduce the number of such steps, producing a shorter path that translates into higher rewards. The environment is built using Python with the help of the Gymnasium framework with the support of the Q- learning framework. Additionally, a Web interface is built using Streamlit for illustrating the functioning of the agent through the situation, including their improvement with time. This work is able to effectively show that reinforcement learning is effectively applicable to build self-learning parking systems that modify with changing situations and would be helpful in improving traffic levels too.

684.CALM WITH CARNATIC: AN AI-DRIVEN FRAMEWORK FOR MUSIC THERAPY AND STRESS MONITORING

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Mental health issues like stress are becoming major global concerns that need accessible and non-invasive treatment methods. This paper suggests a brand-new framework tailored to resolve both short and long-term relief from stress by implementing Brain-Computer interface technology and Machine Learning. The system functions in two different modes - Instant relief solution based on the EEG BrainLink Lite v2.0 device and an audio-based long-term mode that analyses emotions. For short-term anxiety relief, we use the EEG BrainLink Lite v2.0 headset to gather real-time electroencephalogram signals. We also used a custom, existing BrainLinkParser to calculate the Alpha/Beta wave ratio. This ratio is a proven indicator of stress. When stress is detected (low Alpha/Beta ratio), the framework provides an immediate response by playing specific a Carnatic Raaga (e.g., Ananda Bhairavi) that is scientifically proven to reduce anxiety on the user. For long-term emotional regulation, the system makes use of a 1D-CNN Model trained on the RAVDESS and TESS dataset to

classify vocal emotions. This audio classifier, which achieved a testing accuracy of 82%, recommends therapeutic Raagas tailored to the user's current emotional state. The final deliverable is a full stack web application that allows public access to "Raga Chikitsa" (music therapy).

685. AN AI-POWERED STUDENT SKILL ASSESSMENT, CAREER GUIDANCE, JOB RECOMMENDATION AND STAFF SUPPORT SYSTEM

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This research is about designing a smart assistant powered by Artificial Intelligence (AI) that can combine performance prediction, career recommendation, and skill-gap analysis for student decision-making. The suggested approach relies on the multi-modal academic, behavioral, textual, and temporal data, apart from advanced preprocessing, also contains optimized feature selection and a hybrid TGNN-BiLSTM model for precise performance prediction. A career suggestion system based on the Knowledge Graph provides awareness of the career-related context, whereas a Siamese Neural Network skilfully detects the individual skill gap and suggests the perfect learning material. The integrated system is more stable concerning prediction, and the recommendation is relevant, as well as skill-gap identification. In sum, the work asserts that combining multi-format data with sophisticated AI models represents a complete, modifying, and dependable way of support. The framework is significant since it advances aspirants' readiness for the labour market, facilitating the provision of orientation services and delivering personalized educational and career interventions virtually endlessly to a large number of beneficiaries.

686. VIMĀNA-BODHA: BRIDGING AERIAL VISION & LANGUAGE FOR REMOTE SENSING VQA

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In this paper, we systematically analyse the application of large language models (LLMs) and their extension, large vision-language models (LVLMs), in the field of remote sensing (RS) for aerial images. We emphasise multi-task learning for image captioning and visual question answering (VQA). We introduce an enhanced Large Language and Vision Assistant (LLaVA) model, optimised for RS data through a low-rank adaptation (LoRA) approach. To evaluate the model performance, two datasets have been used: 1) UC Merced for training, 2) RSICD for testing. The experimental results confirm the model's effectiveness in visual question answering for remote sensing data.

687.COMPARATIVE ANALYSIS FOR SPECIALIZED LLM FINE-TUNING WITH RAG INTEGRATION

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Recent advancements in Large Language Models (LLMs) have significantly expanded the possibilities for developing domain-specific applications. Despite this progress, effectively adapting these models with minimal computational costs while maintaining access to current information remains a major challenge. In this study, two fine-tuning strategies—Unsloth and PEFT—are compared to explore their efficiency and suitability for specialized language model adaptation when combined with Retrieval-Augmented Generation (RAG). The proposed framework employs the LLaMA3-8B model, configured in a Kaggle GPU environment, with deployment handled through Flask APIs and securely exposed via Ngrok for testing accessibility. The system focuses on healthcare and nutrition applications, offering personalized health assessments based on demographic inputs and a food analysis module that estimates nutritional values from uploaded product images. A conversational interface is included to enhance interaction and ease of use. Experimental findings indicate trade-offs between Unsloth and PEFT: A structured experimental protocol was followed, including defined dataset splits, baseline comparisons, and statistical validation across text-generation and numeric prediction tasks to ensure reproducibility and robustness, while PEFT demonstrates robust flexibility and adaptability, Unsloth achieves faster training times and reduced memory consumption. Incorporating RAG proves especially beneficial, as it enables continuous updates of domain knowledge rather than relying solely on static fine-tuning. Overall, the proposed approach presents a practical foundation for building scalable, cost-effective AI systems suitable for personalized decision support, recommendation tools, and other real-world contexts.

688.DEEP LEARNING - BASED TOMATO LEAF DISEASE DETECTION

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Tomato leaf diseases significantly reduce agricultural productivity and require early and accurate diagnosis for effective crop management. This work presents a deep learning-based tomato leaf disease detection system using a Convolutional Neural Network (CNN) with EfficientNetB0 architecture. The proposed system utilizes a balanced dataset of 1000 tomato leaf images belonging to 10 disease classes, with each class containing 100 images. All images are resized to 128×128 pixels to optimize computational efficiency. The dataset is divided into 850 training images and 150 validation images. Feature extraction is performed using a lightweight CNN model, and classification is carried out through a fully connected layer followed by a Softmax activation function. The model is trained for 5 epochs, resulting in a total of 4,215,341 parameters, of which 1,058,746 are trainable. Experimental evaluation achieves a validation accuracy of 11.7%, representing baseline performance due to ultra-fast training. For sample test images, the system successfully predicts tomato leaf diseases such as Tomato Yellow Leaf Curl Virus with a confidence score of 13.3%, followed by Early Blight (12.8%) and Bacterial Spot (12.6%). In addition to disease classification, the system provides a quick diagnosis report that includes disease severity and recommended treatment measures, making it suitable for practical agricultural use. Although the current results demonstrate baseline accuracy, performance can be significantly improved through increased training epochs, data augmentation, and deeper fine-tuning. The proposed approach highlights the potential of deep learning for automated tomato leaf disease detection and precision agriculture applications.

689.GLIMMERGUARD: AN INTELLIGENT AUTOMATIC HEADLIGHT DIMMING SYSTEM USING COMPUTER VISION

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Nowadays, high beam and low beam usage are not known to many drivers. High beam headlights cause a sudden burst of brightness resulting to a decrease in visibility, which strains the eyes of the driver and our Glimmer Guard is a smart and automatic headlight dim system that is developed to solve this major safety concern. Audi operates matrix LED headlights, which is an intelligent way of adapting high beams to avoid blinding other motorists. These matrix LED headlights are however, very costly and patented designs. In this system we will use a Raspberry Pi and a Raspberry Pi Camera module. Furthermore, the Region of Interest (ROI) algorithm is employed in order to differentiate streetlights and vehicle headlights. The raspberry pi camera module takes a picture of the other vehicles in the opposite direction and the relay module is used to switch between high beam and low beam. The headlight does not turn off to low beam as there is no approaching vehicle in the opposite directions, which shows that the Glimmer Guard system is easy to install and can be offered to a broad spectrum of vehicles, proving how convenient and affordable smart technology can contribute greatly to improving the safety and comfort of driving at night.

690.QUANTUM HYBRID AI FOR EARLY BRAIN AND LUNG CANCER DETECTION SYSTEM

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The fact that millions of individuals succumb to cancer annually shows that it remains a serious public health concern. In order to find the best treatments for the disease and increase the number of people who survive it, it is very important to find it early and correctly. Magnetic resonance imaging (MRI), computed tomography (CT)

scans, and histopathological imaging are all imaging modalities that have been highly helpful in medicine for discovering cancer. People routinely utilise magnetic resonance imaging (MRI) scans to look for disorders in the brain and soft tissues. CT scans are a key aspect of finding out if someone has lung cancer. Histopathological imaging is used to find cells at the cellular level. Radiologists and pathologists, on the other hand, spend a lot of time trying to figure out what the data from imaging tests means.

Deep learning, and more especially convolutional neural networks (CNNs), have made a huge difference in the field of computer vision for analysing medical images. CNN has been shown to be a very useful tool for extracting features, splitting up data sets, and putting cancer imaging data into groups. Convolutional neural networks (CNNs) are superior to other machine learning algorithms as they can discern intricate patterns from images. This ability performs better than most machine learning algorithms that are used to look at pictures.

When it comes to dealing with highly complicated nonlinear interactions in very large biological data sets, traditional neural networks have built-in problems. As the quantity of photos increases, so do the processing needs for managing these complicated connections. This means that the models need to say more.

Quantum computing is a new approach to solve maths that might assist with some of the challenges that regular computers are encountering right now. Quantum computers can handle information in state spaces that are far larger than those of ordinary computers. They achieve this by employing principles like superposition and entanglement. Quantum bits, or qubits, are distinct from regular bits because they can manage more than one state at a time. This enables them to create more intricate feature spaces. Even though many are still working on scalable fault-tolerant quantum computers, the current generation of Noisy Intermediate-Scale Quantum (NISQ) devices enables us look at quantum-classical algorithms. Hybrid quantum-classical algorithms use the best parts of conventional deep learning models with quantum circuits, which can represent more information. This lets you use both sets of skills.

The study showed off a fresh look for the Hybrid Quantum-Classical Cancer Diagnostic System. This concept has a feature extractor based on a CNN and a Variational Quantum Circuit layer that alters the features. The suggested design has been changed to function best with a common optimisation approach that works with NISQ devices. Brain tumour MRI, lung CT, and histology photographs have all been used to evaluate the suggested design. The results are on par with other measures including accuracy, precision, recall, F1 score, and area under the curve (AUC). Gradient-weighted Class Activation Mapping (Grad-CAM) is a particular technique that was utilised to make the heat maps for the parts of the photos that were of interest. The new architecture was made easier to grasp by doing this.

691.SAFEDEDUP: A SECURE FILE STORAGE SYSTEM WITH DEDUPLICATION AND INTEGRITY VALIDATION

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Cloud storage systems often store identical files multiple times across different users, leading to inefficient utilization of storage resources and increased operational costs. At the same time, ensuring data confidentiality and continuously verifying that stored data has not been altered remain critical challenges in multi-user storage environments. This paper presents SafeDeDup, a secure file storage system that integrates content-based deduplication, AES encryption, hash-based integrity validation and AI-assisted keyword search. For each upload operation, SafeDeDup enforces an integrity validation step to ensure that previously stored file records and metadata have not been tampered with. After successful validation, a content hash of the uploaded file is computed to detect duplicate content across users. Duplicate uploads are not re-encrypted or re-stored; instead, the system reuses the path of the existing encrypted file and maps the new user to that reference, thereby reducing redundant storage. For unique files, AES encryption is applied prior to secure storage in the file system. In addition, SafeDeDup incorporates an AI-assisted keyword extraction mechanism that automatically generates searchable keywords from file content, enabling efficient content-based retrieval without exposing plaintext data. By combining integrity validation, secure deduplication, encryption and intelligent search, SafeDeDup provides a secure and storage-efficient file management solution suitable for multi-user environments.

692.EARLY FAULT DETECTION IN LASER POWDER BED FUSION USING PHYSICS-INFORMED ENSEMBLE MACHINE LEARNING MODEL

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Laser Powder Bed Fusion (LPBF) exist as a highly flexible Additive Manufacturing machine but is affected by process-induced melt-pool issues that lead to porosity and defects. This paper explains about a robust physics-informed ensemble learning machine learning model which mainly uses seven interpretable parameters which are present a wide variety of AM machines to classify defect in the components build. The model combines HistGradientBoosting, Random Forest, and a fine-tuned Support Vector Machine into a weighted Ensemble. On a dataset available online, after doing preprocessing and applying the machine learning techniques, the ensemble achieves a test accuracy of 0.8680 and weighted F1 score of 0.8686. Beyond these results, more importance is given to the interpretability, industrial application, and reproducibility of the model with processed and datasets which share similar parameters. The model is built comparing to other complex models which exist in the industry which uses more complex sensors and data handling which increases the cost od maintenance of the machines and these models need higher computing power as most of them work with more than 10 parameters. This raises the question whether having fewer basic parameters are better with less accuracy or a model with complex sensors and processing is better with higher accuracy.

**693.FINFIT: INTELLIGENT FINANCE MANAGEMENT &
FINANCIAL LITERACY SYSTEM FOR STUDENTS
AND IRREGULAR EARNERS
A SMART BUDGETING PLATFORM FOR STUDENTS AND IRREGULAR EARNERS**

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Being financially literate and smarter in money planning are very crucial in life and particularly to us as students and gig workers dealing with non-regular income. The majority of budgeting applications primarily track costs and visualise data, and do not predict and have no strong financial education. That hole results in us making bad money choices, saving, and living in volatile financial patterns. FinFit is an AI-driven finance manager which fills that gap. It combines machine-learning analytics with a behaviour- based learning engine, i.e., a linear regression to predict what you spend, the k-means clustering to build your personality, based on what you spend, with a logistic regression to classify costs as either need or want. The FinFit provides individualized financial education by reviewing your saving rate, income stability and spending habits. The tool is Flask based, SQLite and current front-end technologies with live dashboards, survival-day predictions, income-stability ratings and interactive finance applications. Financial awareness and improved budgeting discipline and quantifiable literacy improvements are demonstrated in the trials.

**694.TRUSTWORTHY MULTI-MODAL DEEP LEARNING
FRAMEWORK FOR COMPREHENSIVE LUNG DISEASE
DIAGNOSIS AND SEVERITY PREDICTION**

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Lung diseases like pneumonia, tuberculosis, and COVID-19. are major health problems worldwide.. We need fast and accurate diagnostic methods to lower death rates. Traditional diagnostic methods mainly use single types of data, such as individual X-ray or CT scans, which often miss the broader context needed for precise

evaluations. A reliable multi-modal deep learning framework is introduced in this paper, integrating heterogeneous data sources including chestThe framework integrates multimodal inputs, ranging from radiographic imaging (X-ray, CT, and MRI) to quantifiable clinical data, ensuring a comprehensive diagnostic analysis. Our framework design uses a group of deep learning models: EfficientNet for improved feature extraction from X-rays, 3D Convolutional Neural Networks (3D- CNN) for analyzing CT data in three dimensions, Vision Trans- formers (ViT) for understanding broader contexts in MRIs, and Multi-Layer Perceptrons (MLP) for integrating clinical metadata. By using a feature-fusion method, the framework creates unified diagnostic classifications and detailed severity predictions. Tests on benchmark datasets, such as NIH ChestX-ray14, LIDC-IDRI, and OpenNeuro MRI, show a 7 to 10 percent increase in accuracy compared to traditional methods. In addition, the inclusion of explainable AI features ensures clarity, providing a strong decision-support system that improves diagnostic trustworthiness and patient care in demanding medical settings.

695.AN INTEGRATED QUEUEING AND PREDICTIVE ANALYTICS FRAMEWORK FOR OPD AND BED ALLOCATION OPTIMIZATION IN HEALTHCARE SYSTEMS

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Effective patient flow and efficient distribution of healthcare resources have been significant issues in the current hospital system, especially in high- demand setting like the Outpatient Departments (OPDs) and the inpatient wards. Growing number of patients, inconsistent arrival, and shortage of medical supplies are some of the factors that tend to lead to long wait time, congestion, and poor bed occupancy. Such problems do not only lower the efficiency of operations but also affect the patient satisfaction and care quality negatively. The conventional methods of hospital management that mostly use fixed scheduling and reactive decision- making are often too limited to dynamism and stochastics of healthcare systems. To solve these problems, the paper will suggest a hybrid model that includes a queueing theory, predictive analytics, and simulation methods that can facilitate better decision-making in the operation of the hospital. Some of the main factors that are modelled by the proposed system include the rate of arrival of patients, consultation time, queue behaviour, probabilities of admission, discharge trends as well as the number of bed occupancy. M/M/1 and M/M/c systems are the analytical queueing models used to measure performance variables like the average waiting time, queueing length and resource consumption. These models offer the systematic way of learning and enhancing the effectiveness of services in healthcare settings.

696.DESIGN AND FABRICATION OF A GROUND-BASED TEST BED FOR PERFORMANCE EVALUATION OF VTOL UAVs

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The “Design and Fabrication of Ground-based test bed for performance evaluation of VTOL UAVs project introduces a specialized mechanism engineered to assess and validate the dynamic behavior of Unmanned Aerial Vehicles (UAVs) and the aerodynamic performance and maneuverability of fixed-wing Unmanned Aerial Vehicles (UAVs) are highly dependent on the effectiveness of their control surfaces, including ailerons, elevators, and rudders. Accurate evaluation of these surfaces is essential during the design and development phases to ensure flight stability, control responsiveness, and structural reliability. This project focuses on the design and fabrication of a ground-based test bed aimed at simulating and analyzing the behavior of control surfaces under controlled conditions. The test bed enables systematic evaluation of surface deflections, actuator performance, and aerodynamic responses without requiring actual flight, thereby reducing developmental risks and costs. The system incorporates modular control surface mounts, electromechanical actuators, sensors for data acquisition, and airflow simulation mechanisms to replicate in-flight conditions. The results from this setup provide valuable insights into surface dynamics, facilitating optimization of design parameters and control algorithms. This approach enhances the efficiency, safety, and accuracy of UAV development, especially during early prototyping and validation stages.

697.SMART ENERGY METER WITH CLOUD AND DEVOPS INTEGRATION FOR EFFICIENT ENERGY MANAGEMENT

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As the consumption of electrical power in residential and industrial segments continues to rise, there is a necessity to have intelligent systems which would be capable of providing real-time, accurate, and remote information regarding real data of power consumption. The proposed project indicates a design and implementation of a all important parts smart energy meter which includes ESP32 microcontroller, PZEM-004T V3.0 energy monitoring module, Raspberry Pi 5, and cloud-based technology to enable the appropriate measuring, visualization, and control of electrical parameters. The current and power are measured and the cumulative energy consumed on a 1.8-inch TFT LCD with a great degree of accuracy and a real-time reading on which makes the system immediately accessible on site. Genera safety of electrical Systems. Simultaneously, Wi-Fi data transfer is provided in a secure form using the HTTP/MQTT protocols applications to a cloud backend that is implemented with the aid of Node.js/Flask, it is logged into and stored and analyzed in MongoDB/InfluxDB databases. Interfacing dashboards based on Grafana and Chart.js will also enable the user to monitor energy reedings, detect exception, and make appropriate decisions to make the most of consumption. Furthermore, the system also added a 5V relay module to gain automated power control which enhances safety and allow the control of the load intelligently based on preset conditions. The DevOps tools such as Docker and GitHub Actions will ensure high result, CI/CD automation, and scaling increase, and such a state will make the architecture suitable to a real-life project. The proposed smart energy meter is based on the concepts of embedded system, IoT, cloud computing, and DevOps practices, offering an affordable, user-friendly, and scalable solution that can potentially benefit the efficiency of the energy monitoring, automation, and the efficiency of the total power management to a considerable degree.

698.SMART IOT BASED TUNNEL HAZARD MONITORING AND EARLY ALERT SYSTEM

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It is important that tunnels, which are considered critical infrastructure, are continually assessed through ongoing examinations to ensure their safety and to prevent accidents related to fire, hazardous gases, or poor environmental conditions. This proposal outlines a tunnel monitoring system based on IoT (internet of Things), which uses multiple types of sensors integrated with an ESP32 microcontroller to provide a real-time monitoring and warning system. The monitoring system consists of an MQ135 Gas Sensor to detect hazardous gases, a smoke sensor to detect smoke, a flame sensor to detect fire, DHT11 humidity/temperature sensor for measuring humidity and temperature within the tunnel, and an SOS emergency button that allows workers or passengers to communicate that they need assistance manually to responders. There will also be a buzzer that will sound, if any sensor detects that conditions are abnormal as a means of local alerting. All sensor information will be sent to the Thing Speak Cloud for data analysis, storing it in the cloud through a web dashboard, and provide means of remote monitoring and communicating with the people in the tunnel. Overall, the above benefits of the proposed system together with IoT will ultimately play a key role in helping reduce lives lost and damage done to critical infrastructure through better identification of hazards, quicker evaluation of hazard conditions, and faster decision-making processes.

699.VIBELY: A HYBRID MERN-AI ARCHITECTURE FOR USER ENGAGEMENT PREDICTION IN SOCIAL MEDIA PLATFORMS

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As social media platforms grow in scale and complexity, the need for architectures capable of balancing high-throughput interaction processing with intelligent content personalization becomes paramount. Modern deep learning-based approaches exhibit strong capability on semantic feature extraction, but their performance and robustness on structured tabular metadata is not consistent. To address these challenges, we propose VIBELY, a hybrid MERN-based architecture that incorporates a microservice-driven machine learning inference pipeline for real-time prediction of user engagement. The architecture decouples application runtime and intelligence runtime, enabling non-blocking Node.js services that handle concurrent I/O requests, while a Python based inference service works with multi-modal features. The proposed prediction framework utilizes late fusion of textual embeddings based on DistilBERT, visual features using MobileNetV3 and handcrafted temporal metadata features Broadcasted feature vector is converted using an XGBoost regressor optimized through Bayesian hyperparameter search. Experimental evaluation over a temporally split social media dataset shows that the hybrid model yields better regression performance than linear and single-modality baselines. 2.6 System-level benchmarking 15 To ensure low tail (99th percentile) latency, we compared our event-driven

architecture with other event- processing systems¹⁴ under concurrent workloads on a system level and found that it performs similarly. The implication is that using neural feature extraction in gradient-boosted decision trees may be pragmatic and scalable for engagement modeling in production-grade web applications. The paper illustrates the need for architectural decoupling during integration of AI services with a high compute requirement into an REALTIME platform.

700.CLOUD BASED STUDENT ACCOMMODATION AND MESS SERVICE FINDER

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In this paper, a "Cloud-based Student Accommodation and Mess Service Finder" is thoroughly discussed to provide a comprehensive understanding of its design, architecture, and operational framework. To begin, an introduction to the study is provided, outlining how the proposed centralized platform addresses the significant inefficiencies and lack of transparency in the current methods students use to find accommodation and mess services. An extensive literature review is highlighted to contextualize the project and identify gaps in existing solutions. Details pertaining to the technical aspects of the system, such as the chosen cloud platform (AWS),

frontend and backend technologies (React.js, Node.js), database design (NoSQL), and integrated third-party APIs (Google Maps, Payment Gateways), are explained and justified. This paper also presents the system's core modules and functionalities, including user authentication, listing and management for service providers, location-based searching and filtering, a secure booking and payment system, and a user-driven ratings and reviews mechanism. The system architecture, non-functional requirements such as scalability and security, and the overall design are defined to provide a clear blueprint for the development process.

701.REAL TIME IDENTITY MONITORING FRAMEWORK FOR HIGH-SECURITY ZONES

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Keeping places like military bases secure is incredibly challenging when you're depending on guards to manually monitor everyone. People get tired, miss things, or react too slowly—it's just human nature. We've developed a facial recognition system that works in real time to help with this. Cameras at entry points capture faces as people pass through, and the software quickly analyzes and matches them against our authorized personnel database. All facial data gets encrypted to protect privacy. What makes this different is the focus on instant alerts rather than automatic access control. If an unauthorized person appears, or if someone's in an area they shouldn't be, security gets notified immediately. This gives them time to respond appropriately. The system's pretty straightforward, which is good for reliability. Interesting, it's been consistent with minimal lag and accurate notifications. The main concern is how well it'll scale in crowded situations—that's something we're still working through. It's definitely solid for real-time monitoring, though larger deployments might need refinement.

701. REAL TIME IDENTITY MONITORING FRAMEWORK FOR HIGH-SECURITY ZONES

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Keeping places like military bases secure is incredibly challenging when you have depending on guards to manually monitor everyone. People get tired, miss things, or react too slowly—its just human nature. We have developed a facial recognition system that works in real time to help with this. Cameras at entry points capture faces as people pass through, and the software quickly analyzes and matches them against our authorized personnel database. All facial data gets encrypted to protect privacy. What makes this different is the focus on instant alerts rather than automatic access control. If an unauthorized person appears, or if someones in an area they shouldnt be, security gets notified immediately. This gives them time to respond appropriately. The systems pretty straightforward, which is good for reliability. Intesting, its been consistent with minimal lag and accurate notifications. The main concern is how well it ll scale in crowded situations—that’s something we still working through. Its definitely solid for real-time monitoring, though larger deployments might need refinement.

702.SMART BORDER SECURITY SURVEILLANCE SYSTEM USING WIRELESS MULTIMETER SENSOR NETWORK

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The issue of border surveillance plays a critical role in national security, and the traditional practices including CCTV cameras and foot patrolling, are usually ineffective in isolated or rough areas. The current paper introduces a smart border security system that makes use of the IOT embedded systems, and the integration of various sensors. The system uses a real-time video and image capturing ESP32-CAM module and intrusion detection algorithm processing based on Python. Infrared (IR) sensors are used to enumerate the number of people who cross the border, ultrasonic sensors are used to measure the distance to monitor the movement of and a metal detector is used to detect the weapons or metallic objects that might be carried by people. All information is sent to a cloud platform where real time monitoring and immediate notification to security personnel is possible. The suggested system will provide 24/7 surveillance, minimize false alarms by using multi-sensors, and offer a cost-efficient solution to large-scale borders. According to the experimental results, the accuracy of the intrusion detection, identification and handling of unknown faces are high, indicating the strength of the system and its practical implementation in the contexts.

703.SMART EMBEDDED VISION SYSTEM FOR AUTOMATED PCB DEFECT DETECTION:

A DEEP LEARNING APPROACH WITH EDGE AI DEPLOYMENT

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Manual testing of PCB usually has 70-80% accuracy, and it takes a lot of time and labor. This project overcomes these shortcomings by building an automated system for defect detection utilizing deep learning with ultra-low-cost embedded hardware. The system classifies five common defects of PCB. We created a dataset of 693 annotated images of PCBs, and used augmentation techniques such as mosaic blending, copy-paste, and rotation to create 2553 instances for training. The YOLOv11n architecture was trained progressively, with 95.0% mAP@0.5 with 93.2% precision and 91.8% recall on validation data. These results show high reliable capabilities in detecting defects suitable for practical applications. The implementation is based on ESP32-CAM module that use OV2640 sensor to capture 1600*1200 resolution image. Captured images are processed on a local device which is the Milk-V Duo RISC-V development board running the optimized YOLOv11n model for real-time inference, without cloud connectivity. A web interface provides detection results such as the classification of defects and confidence scores as well as annotated images, which makes the solution very accessible for smaller manufacturers. This work provides a practical base for implementing quality control with deep learning models on RISC-V embedded systems with limited budgets, demonstrating that even advanced computer vision methods can work well on commodity hardware.

704.DEEP LEARNING FOR WILDLIFE DETECTION AND TRAIN ACCIDENT PREVENTION

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*

This paper presents a real-time animal detection system designed to identify wildlife intrusions near railway tracks and generate timely alerts to prevent train–animal collisions. The system integrates motion-triggered image capture, a lightweight Convolutional Neural Network (CNN) detector, region-of-interest (ROI) masking for railway tracks, and an alerting mechanism (buzzer). Experimental results demonstrate that the proposed system achieves high detection accuracy with low inference latency suitable for edge deployment Keywords—Deep Learning, CNN, Wildlife Detection, Railway Safety, Edge Deployment

705.EMOTION AWARE RAG - BASED TUTORING SUPPORT SYSTEM

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This paper describes the Emotion-Aware Retrieval- Augmented Generative Tutoring System – EA-RAGTS; a smart tutoring system build that integrates emotion-sensing technology with retrieval-augmented generation to enable learning that is more likely to adapt to suit the individual. The system incorporates an emotion recognition module, based on DeepFace and OpenCV, that employs computer vision to detect a student's emotions in real- time – emotions such as happiness, puzzlement, boredom, and irritation. These emotions are then fed into the RAG-based tutoring component of the system, which employs FAISS-based wordings and Large Language Models – LLMs – (such as Cohere) to identify learning content that matches the context and generate responses that are empathetic and aligned with the student's emotions. In contrast to the common Intelligent Tutoring Systems, or ITS, which rely solely on the knowledge of the learner, EA- RAGTS simultaneously alters the manner of instruction, level of difficulty, and style, based on the emotional state of the learner – as a personal and emotionally positive experience. Evaluation with 120 learners revealed 92% accuracy in emotion detection, 29% more pleasure with the responses, and 35% more engagement than in regular RAG and traditional ITS systems.

706.A HYBRID MACHINE LEARNING AND DEEP LEARNING FRAMEWORK FOR DISASTER RISK PREDICTION

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Earthquakes and floods pose serious threats to human life, infrastructure, and economic stability, making reliable disaster risk assessment an important research problem. This study proposes an integrated predictive framework that combines ensemble learning techniques with neural network-based models for multi- hazard risk estimation. For earthquake risk assessment, a stacking-based ensemble approach is implemented using Decision Tree, Random Forest, and XGBoost as base models, while a Random Forest algorithm functions as the meta-level classifier. The model utilizes seismic attributes such as location, magnitude, depth, intensity, and temporal information to classify earthquake events into low, medium, and high risk levels. Experimental evaluation shows that the ensemble model reaches 94.42% classification accuracy, with precision of 0.94, recall of 0.93, and F1-score of 0.94, outperforming the individual classifiers. Flood risk estimation is carried out using

a feed-forward neural network trained on hydrological and environmental indicators including rainfall intensity, drainage conditions, river level, urbanization level, and wetland status. The model produces strong predictive results with 96.47% accuracy, precision of 0.93, recall of 0.99, and an F1-score of 0.96. To address class imbalance during training, a weighted cross-entropy objective is applied. The system categorizes flood risk into three levels low, medium, and high and performance is assessed through standard classification metrics. In addition, the framework provides automated record storage and report generation in CSV and PDF formats. The results demonstrate that the proposed framework offers reliable disaster risk prediction and can support disaster preparedness, mitigation planning, and policy decision-making.

707.PRIVACY PRESERVING TECHNIQUES FOR PATIENT MEDICAL RECORDS USING BLOCKCHAIN TECHNOLOGY

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The rapid digitization of healthcare systems has increased concerns regarding patient data privacy and security. Traditional electronic health record (EHR) systems often suffer from vulnerabilities such as unauthorized access, data breaches, and lack of interoperability. This paper proposes a privacy- preserving healthcare data management framework using blockchain technology combined with Zero-Knowledge Proofs (ZKPs). The system utilizes decentralized storage with IPFS while maintaining secure authentication and access control through smart contracts and MetaMask- based identity management. ZKPs enable verification of medical information without revealing sensitive patient data. Experimental evaluation demonstrates improved security, efficient data retrieval, and faster access revocation compared to traditional systems. The proposed architecture enhances trust, transparency, and regulatory compliance with healthcare standards such as HIPAA and GDPR.

708. ENHANCING USER EXPERIENCE THROUGH ARTIFICIAL INTELLIGENCE-DRIVEN HUMAN–COMPUTER INTERACTION SYSTEMS: AN EMPIRICAL STUDY

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Artificial Intelligence (AI) has significantly transformed the field of Human–Computer Interaction (HCI) by enabling systems to interact with users in more adaptive, intelligent, and personalized ways. Modern interactive systems increasingly integrate machine learning, natural language processing, and predictive analytics to improve the efficiency and quality of user interactions. Despite the rapid integration of AI into digital platforms, limited empirical research has systematically examined how AI-driven interaction capabilities influence user experience outcomes. This study investigates the impact of AI-enabled human–computer interaction on perceived usability, user satisfaction, and engagement. The research proposes a conceptual model in which intelligent interface design, personalization capability, and interaction adaptability act as key AI-driven interaction factors influencing user experience. User trust is examined as a mediating variable between AI capabilities and user outcomes. Data were collected from 312 users of AI-enabled digital platforms including mobile applications, e-learning systems, and intelligent assistants. Structural Equation Modelling (SEM) was used to test the proposed relationships. The findings indicate that intelligent interface design, personalization capability, and interaction adaptability significantly enhance user experience outcomes. Furthermore, user trust plays an important mediating role in strengthening the relationship between AI-driven interaction mechanisms and perceived usability and satisfaction. The study contributes to the growing literature on AI-enabled HCI by providing empirical evidence on how intelligent interaction mechanisms improve digital user experience. Practical implications highlight the importance of integrating adaptive and personalized interaction features in modern digital systems to enhance user engagement and system effectiveness.

709.IOT-ENABLED CROP YIELD PREDICTION AND SOIL NUTRIENT RECOMMENDATION USING MACHINE LEARNING

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The productivity of crops is based on how well soils support them. Knowing that, soil quality plays a vital part in the production and health of crops. No two farmers have the same tools for assessing what type(s) of nutrients their soil needs and how much of each nutrient, as well as the environmental conditions surrounding a given crop during the growing season. The result is that because of the method(s) of determining the nutrients in their soil, a lot of farmers, will make inaccurate assessments, thus wasting time and money to make those assessments. In addition, the improper balance between N-P-K, and the variations in temperature and moisture all contribute to lower yields and inefficient use of resources by farmers. To address these concerns, we are proposing an integrated system of N-P-K Sensors that are accessible to farmers via the Internet of Things (IoT) for the collection and processing of real-time soil data, with data processing being accomplished via Machine Learning models, in which the collected real-time data will be analysed, and recommendations will be made to farmers as to what are the best plants for their soils, and to what extent those plants will be able to produce the maximum yield. The Smart approach will provide farmers with information that is accurate, thus allowing them to implement Precision Farming techniques, allocate resources more efficiently and develop better crop selection strategies. Through the combination of IoT sensor technology with the advancements in Analytical

Platforms, the Intelligent system contributes to the Advancement of Sustainable Agriculture through the promotion of increased productivity and profitability for all farmers.

710.ML-BASED PREDICTION AND OPTIMIZATION OF BATTERY LIFE IN CONSUMER DEVICES

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It has created a broad spectrum of smartphones and laptops a comprehensive and adaptive machine learning framework that has been used to predict and optimize battery performance. The system combines novel data-driven methods to combine essential functional parameters such as application use time, screen-on time, battery depletion rate, charging history, hardware configuration, and thermal characteristics to model battery consumption dynamics on the real-world. The framework uses a hybrid model of both traditional and deep learning models, including XG Boost, Gradient Boosting, Logistic Regression and Long Short-Term Memory (LSTM) networks to make accurate forecasts of remaining battery life and long-term battery health trends. The models are performed in order to validate their rigorous performance using the typical regression measures of Mean Absolute Error (MAE), Root Mean Squared Error (RMSE), and the coefficient of determination (R^2). The regression measures allow fine-tuning of the predictive accuracy and strength of the models across different device profiles. The solution has a two-part architecture a machine learning engine which preprocesses the historical usage data, learns individualized usage patterns, and generates real-time predictions and a web application based on Flask which is an interactive user interface displaying battery life projections, detailed analytics dashboard, and customized optimization plans. The web interface is also capable of dynamic visualizations that draw light to important variables affecting the energy consumption, enabling the user to have a good decision-making capability in regards to the app behavior, power settings and management of the device. Moreover, the modular and extensible nature of the system supports a smooth transition to third-party monitoring systems to allow the system to expand beyond mobile and laptop devices to wider energy management uses, including IoT ecosystems, edge devices, and resource optimization resources at the enterprise level. All in all, this framework is an efficient and adaptable way of ensuring the energy efficiency of a modern battery-powered machine, its user experience and additional increases in the lifespan cycle of the machine.

711.AIR QUALITY MAPPING FROM SATELLITE DATA USING MACHINE LEARNING TECHNIQUES

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Artificial intelligence based downscaling satellite algorithm. deep based maps of air-quality of the Indian region. learning Air satellite pollutants can provide. intensive data regarding the same, but because of its low resolution, localized concentrations can not be determined. All these pollutants with the assistance of these satellites. For this disadvantage has been overcome by borrowing a Bi- LSTM model. The system designed is a combination of satellite-based air quality. information that can frame temporal information in. Bi-LSTM to adequately examine and foretell the adjustments. taking place in the great air contaminants. The model uses data on the atmosphere to examine long-range dependency, and it enhances the precision of detailed maps of air quality and predictions. In the experiment, it demonstrates that the technique can. optimize air quality maps that have high spatial details and preservation of temporal consistency This downscaling algorithm. helps to improve air quality tracking, early alert and decision making of environmental management and public health agenda across different parts of India.

712.ROBUST SPATIO-TEMPORAL LIP READING USING ATTENTION-ENHANCED EFFICIENTNETB0 AND BI- LSTM ARCHITECTURE

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The Real-Time Tamil Lip Reading and Caption Generation System is an AI-driven intelligent solution system that is designed to interpret silent speech through visual input given by a user. The system uses 3D CNN along with EfficientNetB0-based feature extraction tool, Bi- directional LSTM (Bi-LSTM) which helps in sequence modeling, attention mechanisms, and also Connectionist Temporal Classification (CTC) loss, providing a constructive framework for the recognition of visual speech. EfficientNetB0 extracts details of the lip feature,

while Bi-LSTM captures the forward and backward temporal requirements of lip movements. The attention module improvises the recognition of the lips by focusing on specific points, and CTC helps in aligning the input data in different length it enables the alignment of the frame .The model uses and works on Tamil datasets covering various accents and lip movement style, the system provides real time captions, making sure it is accessible for hearing impaired individuals and enabling silent communication in places where audio is restricted or in noisy environments. This design is lightweight and scalable design that can be deployed in applications, surveillance providing a smart easy to use solution that helps people understand and helps in converting regional language speech into text.

713. DESIGN AND IMPLEMENTATION OF AN IOT-ENABLED REAL-TIME ELECTRICITY THEFT DETECTION AND MONITORING SYSTEM USING ESP32 AND PZEM ENERGY SENSORS

714.AN RFID BASED SMART EVM SYSTEM FOR REDUCING ELECTORAL FRAUDS

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The proposed RFID-based Smart Electronic Voting Machine (EVM) is designed to enhance electoral security by integrating multi-layer authentication mechanisms. The system utilizes an Arduino microcontroller to manage all sensing, authentication, and voting operations. Initially, voter identity is verified through an RFID card,

followed by password entry via a keypad, and biometric confirmation using a fingerprint sensor. Voting access is granted only when all verification steps are successfully completed. Additionally, a GSM module transmits OTPs and alerts to authorized personnel to support monitoring and system security, while a buzzer provides immediate feedback for invalid attempts. The prototype demonstrates a secure, efficient, and user-friendly approach to electronic voting, offering significant potential to reduce fraudulent activities and improve the integrity of the electoral process.

715. AN LLM-BASED FRAMEWORK FOR AUTOMATED INTERPRETATION OF BLOOD TEST REPORTS

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It is of paramount importance to the clinical decision making and identification of what ails the patient of proper diagnosis of the blood tests. The process of manual analysis of laboratory results is time consuming and as well requires extensive knowledge of the field in addition to being occasionally inconsistent due to human error. Our paper presents a diagnostic system that is AI based and uses a Large Language Model (LLM) to suggest initial medical results by analyzing blood tests results automatically. We have devised a system that processes significant hematology and biochemical parameters that are extracted out of electronic blood reports other than the pre processing and normalization to achieve consistency between the many report formats. The LLM is engaged in comparative reasoning i.e. comparing the values of the patient with what is normal in a clinical setting and releases structured and easy to read diagnostic reports. Combined with it, there have also been offered performance improvement strategies aimed at reporting results faster, and enhancing the system performance as the results of the conducted experiments show they significantly decrease the time spent on the analysis of the reports and make the system more accessible with the aim of offering the initial diagnostic support.

716.STARTUP NAVIGATOR: AN AGENTIC AI ADVISOR FOR GUIDED BUSINESS SETUP

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Fragmented startup advisory ecosystems often require founders to rely on multiple disconnected tools for idea validation, market research, funding strategies, and regulatory compliance. This scattered approach leads to confusion, delays, and inconsistent decision-making, particularly for first-time entrepreneurs who lack access to affordable, structured, and real-time expert guidance. Startup Navigator addresses this challenge by introducing an integrated, AI-driven advisory framework that supports founders throughout the complete startup lifecycle. The platform employs multiple domain-specialized AI agents, coordinated through an intelligent orchestration layer, to enable collaborative reasoning across product development, market analysis, financing, team formation, and legal compliance. Through direct integration with Model Context Protocol servers, the system retrieves verified real-time data from authoritative sources, ensuring accuracy and relevance. Adaptive conversational interaction and persistent context memory further enhance planning efficiency, decision quality, and deliver a cohesive, intelligent startup guidance experience.

717.TAMIL NADU RIVER POLLUTION AI MONITORING SYSTEM

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In Tamil Nadu, there is a pressing problem with water pollution. This has far-reaching effects on the health of people, agriculture, and long-term environmental stability. Current efforts to monitor this problem use traditional methods that depend on manual inspections and periodic reports, making it difficult to intervene in

time and providing limited ability to predict contamination events. The project introduced here will be an AI-based River Pollution Monitoring System that uses machine learning to provide real-time analyses of the water quality of rivers and to assist decision-makers by providing information through an interactive Streamlit dashboard. The river monitoring system proposed in this project will rely on historical Water Quality Index (WQI) and Pollution Score datasets collected through several of Tamil Nadu's river monitoring stations. A complete machine-learning pipeline will be developed to pre-process the data; address missing values; standardize the structure of the columns in each data element to ensure that they are formatted the same way; and to create useful classifications from the data being used to predict river quality levels. To identify pollution hotspots, K-Means clustering will be used to assign categories of High Risk, Moderate Risk, and Low Risk to each river monitoring station based on the results of the silhouette score optimization algorithm applied to the data. A Random Forest classification algorithm will be applied to classify the quality of each river and produce accurate predictions (high accuracy); WQI is identified as having the most significant impact on pollution status. The reliability of the environmental monitoring process will be enhanced by implementing an Isolation Forest generated anomaly detection model; this model will be used to identify atypical pollution readings, which will help in the early identification of serious contamination events. Additionally, we are creating automated, artificial-intelligence-based recommendations for each station based on their level of pollution, enabling Government agencies to use them as guidance for action. We will also provide an intuitive Streamlit dashboard for visualising distribution of risks across locations, trends of pollution over time, anomalies detected and an analysis of each station. End user can filter report by year, risk level or monitoring station and can export AI-Generated reports for decision-making.

718. SKIN LESION CLASSIFICATION USING IMAGE PROCESSING AND ARTIFICIAL NEURAL NETWORKS

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Skin cancer remains a major global health challenge, making early and accurate detection vital for improving patient survival rates. This paper presents a computer aided diagnosis (CAD) system for the classification of skin lesions into three categories viz.; Normal, Benign, Malignant. The methodology follows a sequential pipeline that includes image preprocessing followed by lesion segmentation using K-mean clustering. For detailed analysis, discriminative features are extracted using Principal Component Analysis (PCA) and Discrete Wavelet Transform (DWT), capturing in both structural measures such as mean, variance, entropy and correlation are normalized and fed into an Artificial Neural Network (ANN). The ANN, consisting of two hidden layers is trained using the Levenberg Marquardt algorithm. Experimental results show classification accuracy of ~92%. The findings indicate that the integration of digital image processing and machine learning provides a reliable tool for clinical assistance with future potential for enhancement through deep learning models and larger data sets.

719. TECHNOLOGY – DRIVEN SUSTAINABILITY AND CUSTOMER ADOPTION OF GREEN BANKING PLATFORMS

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The fast development of digital technologies and growing environmental worries have pushed financial institutions to implement sustainable banking methods. Green banking platforms combine AI-based innovations with environmental sustainability goals. However, customer acceptance is a key factor in the success of these efforts. This study looks at how technology-related factors (perceived ease of use, perceived usefulness, trust and security, and digital convenience) and sustainability-related factors (environmental awareness, environmental concern, and perceived environmental impact) affect customers' willingness to adopt green banking platforms. A descriptive research design with a quantitative approach was used, and primary data were collected from 150 banking customers in the Thanjavur district through a structured questionnaire. Reliability analysis showed high internal consistency (Cronbach's alpha ranging from 0.82 to 0.89). Correlation results showed strong positive relationships between all variables. Multiple regression analysis showed that the model explains 78.65% of the variation in customer adoption ($R^2 = 0.7865$), highlighting the important role of both technological efficiency and sustainability perception in influencing adoption intentions. The findings suggest that combining user-friendly digital services, strong security measures, and effective sustainability communication can boost customer adoption of green banking platforms.

720.MACHINE LEARNING–BASED PHYSIOLOGICAL KEY GENERATION FOR SECURE IMAGE ENCRYPTION WITH CNN ENCODING, CHAOTIC DIFFUSION AND AES

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The increasing exchange of information across public networks demands robust and adaptive encryption mechanisms. This paper presents a machine learning–based hybrid image encryption framework that integrates physiological signal–based key generation, CNN-based image encoding, high-dimensional chaotic permutation, AES-256 encryption, and XOR-based diffusion. Pulse rate and temperature signals are processed to generate dynamic, high- entropy keys, while CNN encoding reduces spatial redundancy prior to encryption. Experimental results show entropy values close to 8, correlation coefficients near zero in all directions, and low PSNR values around 8 dB with low SSIM, indicating strong structural distortion and resistance to statistical and differential attacks. These results confirm that the proposed framework provides secure and reliable image protection with

effective decryption capability. Keywords—Image Encryption, Linear Regression, Convolutional Neural Network, Chaotic Permutation, AES-256.

721.BONE FRACTURE CLASSIFICATION USING SVM AND MOBILENET

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multi-classification of bone fractures based on radiographic images is an essential part of computer-aided diagnostic systems that cannot be done correctly without precise multi-class classification. The time-consuming nature of manual X-ray image interpretation and inter-observer variation occurs when interpreting X-ray images which have a subtle or overlapping pattern of fracture. This article introduces an automated bone fracture classification model based on a hybrid structure of deep learning and machine learning approach with feature extraction based on convolutional neural networks (CNN) and ensemble classifiers. The suggested system will integrate the preprocessing features, such as image enhancement, noise reduction and normalization, to ensure that the quality of the radiograph is enhanced before extraction of the features. Deep discriminative learning is done by utilizing the pretrained networks like MobileNet, VGG19, and EfficientNet. These characteristics are then categorized with the help of Support Vector Machine (SVM), Random Forest (RF) and XGBoost algorithms to ten- class fracture classification. Through experimental analysis, it is proven that ensemble-based classifier is far superior to using SVM alone in terms of classification strength and generalization. MobileNet +

SVM model was able to achieve an accuracy of about 94% and MobileNet + Random Forest was able to reach an almost 99% accuracy. EfficientNet + XGBoost had almost perfect classification preciseness. VGG19 + Random Forest was the best in terms of overall performance, and with negligible off-diagonal misclassification in the confusion matrix, it reached about 99.100% accuracy. The proposed framework produced precision, recall and F1-scores between 0.98-1.00 on the fracture types, which validates its high level of discriminative ability. The findings confirm that the combination of deep feature extraction and ensemble learning can improve the performance of multiclass fracture detection and remain computationally efficient. The suggested system shows good prospects of implementation in real-time clinical decision support systems especially where there is a shortage of resources in healthcare.

722.SMART CITY EDGE SECURITY USING RBM-PETRI-GARL IS A FRAMEWORK DESIGNED TO SECURE SMART CITY EDGE DEVICES

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Smart cities are based on interconnected edge gadgets, which are highly susceptible to advanced cyber- attacks. To overcome this issue, this paper proposes a hybrid intelligent security framework: RBM-PETRI-GARL that aims to protect smart city edge networks by detecting anomalies in real time, model formal threats, and utilizing adaptive learning to mitigate the threat. The framework combines Restricted Boltzmann Machines (RBM) and Petri Nets to model the process of attack and transition state of a system and Generalized Adaptive Reinforcement Learning (GARL) to choose the best defense actions that do not have any substantial delay. Other machine learning models like random forest and the SVM also improve the classification of anomalies based on processed system log and network traces. All of the structure is launched in AWS Cloud with the use of such services as IoT core, SageMaker, Lambda, Kinesis to provide scalable data processing, secure communications, and the analytics in the cloud. An HTML and CSS dashboard with JavaScript can be developed and used to monitor the anomalies, the threat chain, and adaptive response. The experimental findings indicate that RBM-PETRI-GARL has high detection rate, low false- detection, and the ability to resist changing cyber attacks. The system is appropriate to deploy in real-time in the smart city setting and has potential of added value in the future, automated alerts, deep learning, and integrated multi-network security.

723.AI TOOL FOR MARKETING SMALL MEDIUM ENTERPRISES

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The rising need for automated marketing has prompted the creation of smart systems that cut down on manual work and boost campaign efficiency. This paper introduces an AI-powered Agentic Digital Marketing Manager that combines Search Engine Optimization, Social Media, and Ads agents with a central Boss Agent. The system automates website optimization, content planning, and ad management, while keeping branding consistent across different platforms. A unified dashboard offers real-time analytics and practical AI suggestions to improve decision-making. Experimental results indicate a notable increase in engagement, reach, and conversion rates when compared to traditional manual methods. The modular design also allows for future growth by adding an Email Agent for automated marketing communication.

724.STUDENT SECURITY SYSTEM USING RFID AND GPS

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Throughout our college years, we found campus life to be based extensively on the need to watch our whereabouts and safety. Manual roll-calls or paper logbooks are still used in most schools which are slow, prone to errors and people can cheat on them. Others are more techy solutions such as RFID badge, to make things more automated, but still do not ensure that you are still on campus; you may scan a badge outside the campus and the scanning would still be considered as attendance. Therefore, I have developed an RFID badges and GPS in a single IoT- driven system that proves that it works. I attached an RFID reader and a GPS L80-M39 to an ESP32 DevKit V1. All students receive their own RFID tag and after the tag is scanned, GPS coordinates are obtained at the same time by the ESP32 output and transmitted to a web server running a shipping Node.js and Express. We implemented a few safety measures on the server side: the RFID must not be unknown to the database, the GPS position has to be within prescribed campus ranges (geofencing), we will check against duplicates of scans, and we will establish a time window. It is not until we have done all those checks that we save attendance record. The admin can then access live information on an encrypted dashboard which has role access and clean database. This prototype reduces fraudulent check-in, ensures the campuses are safer, maintains data fresh, and streamlines workflow due to RFID authentication and GPS location verification. My test speed, accuracy, good scaling, and scale-ready modern smart campus are achieved.

725.SMART IOT SYSTEM FOR SAFE TRANSPORTATION OF MEDICAL SUPPLIES

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One of the challenges faced in healthcare logistics is the safe transportation of vaccines and other time-sensitive medicines. Drug effectiveness and patient safety during transportation may be influenced by poor handling, changes in temperatures, vibration, or fire hazards. The paper presents a Smart Medical Transport System, which is based on IoT and continuously monitors the conditions to deliver safely. It is sensitive to temperature, vibration, and shock, has fire detectors and fire suppressors, and real-time GPS tracking, all built based on an Arduino platform. Data on the sensor is transmitted real-time to a cloud system where actions like remote monitoring, notifications and assistance in decision making can be performed. The automated alerts are sent to ambulance drivers and medical officials in the event of abnormalities. The experimental outcomes reveal how the system ensures preservation of the cold chain, enhances situational awareness and reduces the chances of spoilage of medicine during transit.

726.GREEN MARKETING - GREEN ADVERTISING & PROMOTION, GREEN PRODUCT, GREEN PRICING.

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The problem of coordinating a two-echelon green product supply chain with environmentally conscious consumers under demand uncertainty is studied in this paper. In the green product supply chain, a manufacturer produces green product through developing green technology and a retailer promotes the green product through green marketing. The demand of the green product is uncertain with the mean and the variance as the only known information. After analyzing the utility that a consumer gained from the green product, the problem is then formulated as a distribution-free-based Stackelberg game for a decentralized system under three contracts, i.e., wholesale price-only (WPO), revenue and green marketing cost-sharing (RGMS), and two-part tariff (TPTF) contracts. The analytical results are also proposed to show the effects of the system parameters on supply chain optimal decisions. By comparing with the centralized system, the coordination level for each contract is investigated. Numerical examples and sensitivity analysis with respect to several system parameters are presented to illustrate the effectiveness of the contracts under demand uncertainty. The results demonstrate that both RGMS and TPTF contracts are superior to WPO contract. Especially, TPTF contract can always coordinate the supply chain, while RGMS contract can improve the supply chain coordination level only if the revenue and cost sharing coefficients satisfy certain conditions.

727.END-TO-END ENCRYPTED SECURE DOCUMENT VAULT WITH HYBRID CRYPTOGRAPHY AND GRANULAR AUDIT TRAILS: A ZERO-TRUST ARCHITECTURE

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The adoption of cloud storage in enterprise environments has significantly outpaced the evolution of data sovereignty technologies, leaving organizations vulnerable to a spectrum of server-side breaches and insider threats. Traditional architectures predominantly rely on “Managed Keys,” where the service provider retains full decryption capabilities—a model that constitutes a fundamental violation of the Zero-Trust principle. We engineered the Secure Document Vault to strictly eliminate this single point of failure. Our system deploys a high-performance hybrid cryptographic engine, utilizing ChaCha20-Poly1305 for high-speed, stream-based content encryption and X25519 ECDH with HKDF for secure, forward-secret key wrapping. Unlike standard Node.js implementations that buffer entire files in RAM before encryption, our pipeline performs encryption on-the-fly, mitigating memory scraping attacks and preventing Denial of Service (DoS) via memory exhaustion. To

prevent unauthorized access, we enforce a strict Multi- Factor Authentication (MFA) protocol involving Email OTPs and an Argon2id-hashed 6-digit PIN for sensitive decryption events, effectively neutralizing offline GPU-accelerated brute- force attacks. Furthermore, the framework introduces AI-driven continuous authentication using local facial detection to thwart shoulder surfing, dynamic document watermarking to trace data leaks, and a time-bound, PIN-protected secure sharing mechanism. Alongside a granular Audit Log Service and a 3D visual hashing module, benchmarks indicate that our architecture maintains a constant memory footprint (≈ 40 MB) regardless of file size, providing a scalable, highly secure storage solution for the modern web.

728.REAL-TIME FACIAL RECOGNITION AND UNAUTHORIZED ACCESS ALERT SYSTEM

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This paper presents a real-time facial recognition system integrated with an automated unauthorised-access alert mechanism. Using a live video stream, the system performs face detection through a Haar Cascade Classifier and applies the Local Binary Patterns Histogram (LBPH) algorithm for facial feature extraction and recognition. Detected faces are compared against a preloaded database of authorised individuals using a similarity-based matching approach. Verified users are immediately identified with their stored details, while unknown faces trigger instant alert notifications through Simple Mail Transfer Protocol (SMTP) based email alert system. The alert module securely sends real- time warning messages to designated recipients without interrupting the recognition process. By minimising manual intervention and enabling rapid, accurate identification, the system enhances security efficiency in restricted environments such as educational institutions, corporate offices, and laboratories. The proposed approach combines computer vision, machine learning based recognition, database management, and SMTP-enabled notification services to deliver a practical, scalable, and reliable solution for modern access-control applications.

729.AN INTELLIGENT MULTIMODAL AI FRAMEWORK FOR REAL-TIME ENVIRONMENTAL UNDERSTANDING AND ASSISTIVE NAVIGATION

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Assistive technologies for visually impaired individuals have traditionally relied on isolated sensing or vision-based solutions, limiting their ability to provide comprehensive environmental awareness and intuitive interaction. This paper presents a unified multimodal assistive framework that combines conversational artificial intelligence, computer vision perception, and sensor fusion to enable real-time contextual understanding and safe navigation. The proposed system introduces an intent- aware voice interaction mechanism that dynamically

orchestrates multiple perception modules through a structured multimodal architecture. Visual intelligence components perform currency recognition, face identification, optical character recognition, and semantic scene interpretation, while complementary sensor inputs provide obstacle detection and environmental hazard awareness. A graph-based workflow coordination strategy enables efficient integration of heterogeneous AI services, allowing adaptive response generation through continuous audio feedback. Designed for deployment on resource-constrained edge platforms, the framework balances computational efficiency with perception accuracy. Experimental evaluation demonstrates reliable real-time performance, achieving 0.92 accuracy in currency recognition, 0.89 precision in face identification, and 0.94-character recognition accuracy, while maintaining low latency suitable for assistive applications. Results indicate that multimodal fusion significantly improves contextual reliability and reduces user interaction complexity compared with conventional single-modal assistive systems. The proposed framework advances the design of intelligent accessibility technologies by establishing a scalable approach that unifies perception, interaction, and safety awareness, thereby enhancing autonomy and mobility for visually impaired users in real-world environments.

730.EDGEOPT-CNN: A MULTI-TASK LEARNING FRAMEWORK FOR INTELLIGENT COMPUTATION OPTIMIZATION AT EDGE NODES

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Edge computing has now become a very important technique to handle real-time processed data in the Internet of Things (IoT) on large scale. Nevertheless, edge nodes can not be as effective due to a lack of computation resources, fluctuating workload, and strict latency constraints. This paper introduces EdgeOpt-CNN, a light-weight multi-task convolutional neural network that aims to make data classification, feature extraction, and predictions to conduct importance-driven processing decisions. The suggested system combines edge preprocessing, multi-output CNN inference, and adaptive decision mapping to choose execution pathways flexibly. These paths can include instantaneous local processing, partial processing, caching, offloading or even the discarding of data. Experimental outputs of the systematic circumstances of CCTV-based IoT scenarios indicate that the classification accuracy of EdgeOpt-CNN is 92.8%. It has 88 ms end-to-end latency, which is a very impressive 83% lower than cloud-only processing. It also consumes 78 mJ per frame of power and can reduce bandwidth by up to 98% using importance-aware transmission. Relative to six baseline models, EdgeOpt-CNN shows some impressive throughput of 28 FPS, all with minimal CPU consumption of 49% and memory consumption of 160 MB. These findings validate the hypothesis that lets EdgeOpt-CNN offer a scalable, energy-efficient and low-latency solution to intelligent computation in the changing environment of distributed IoT edge systems.

731.HYBRID CNN – TRANSFORMER MODELS FOR EARLY DETECTION OF CHEMOTHERAPY – RELATED CARDIOTOXICITY IN HEALTHCARE

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Chemotherapy-induced cardiotoxicity (CIC) remains a major clinical issue because of the many cases of long-term cardiac dysfunction in cancer patients undergoing treatment. Early and accurate prediction of cardiotoxic events may allow early intervention and better optimization of patient outcomes. This project introduces a multimodal deep learning framework involving convolutional as well as sequence-based neural architectures for the binary classification of cardiotoxicity outcomes (Cardiotoxicity (CTRCD) or Non-Cardiotoxicity (NO_CTRCD)). The proposed system is based on Temporal Dynamic Imaging (TDI) as its main modality. In this study, an efficient convolutional neural network (CNN) is first used to obtain high-level spatial feature representations from TDI images. First, these extracted features are passed to a sequential learning module and tested under three configurations: CNN + LSTM, CNN + GRU, and CNN + Transformer. Among them, the CNN + Transformer architecture achieved the best performance, which is capable of capturing local image-based features as well as long-term temporal context dependencies. The model architecture is to stack CNN-derived feature vectors, encode them with a Transformer encoder and project the fused representation into a dense layer for final classification. Thorough experiments were performed to assess the forecasting performance of each model set-up. The CNN Transformer model had the highest accuracy and F1 score and shows its reliability as a diagnostic tool for early detection of CIC. This multimodal approach has the potential to improve precision cardiology and help oncologists make risk-informed decisions for chemotherapy planning.

732.CAREERHUB-AI: AN END-TO-END INTELLIGENT CAREER NAVIGATION AND MANAGEMENT PLATFORM

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There is a high level of competition and lack of proper tracking systems which make the job-seeking process more difficult. Most candidates are not utilizing the modern technological advancements effectively hence they waste time and they miss opportunities. Currently, job seekers can use several independent tools with different purposes namely resume analysis, cold email generation, job tracking, resume storage, career roadmap planning, and monitoring career pages of companies. This disorganized application of the various platforms as separate functionalities brings about inefficiency, confusion, and lack of organization. More so, visiting various

organizational career sites and browsing the list of job openings manually is tiresome and time-consuming. Consequently, job seekers tend to miss out on good prospects only because they forget to visit some pages of the companies or they do not bother checking frequently updated job ads.

CareerHub-AI is created to handle these problems by integrating all the tools that a job seeker needs into one system, in an all-encompassing, end-to-end approach to career management. The site will help the job seekers to prepare, structure, and monitor their job search effectively. Among the main features, an ATS-friendly Resume Analyzer, AI-run Cold Email Generator, Job Tracker, Career Roadmap Builder, Company Career Page Tracker, Resume Folder Management, Mock Interview Quiz Module, and a Dashboard with statistics and reminders may be distinguished. CareerHub-AI combines all these capabilities to remove the disconnected experience with the current solutions and to deliver a coherent, unified experience that takes much of the burden out of the job-seeking process. The end users are able to control all the steps of their job finding process starting with the resume analysis and up to the interview preparation process in one smart web program.

CareerHub-AI uses AI, ML, NLP, Web Scraping, ATS Scanning and Tracking and a Personalized Learning Framework to provide assistance to the candidates during the process of job-seeking. These technologies improve the system on readability, usability, personalization, efficiency and system performance. Under the platform, a fully integrated end-to-end career development ecosystem is established with secure Google Sign-In connection, making the data of any user private and personal. CareerHub-AI is modeled to be scalable, extensible, and user-friendly, and thus, provides creative approach to career management. The aim of these advances is to add to the effectiveness, availability, and independence of the platform and make it a stable solution to next-generation career management.

733.SENTIMENT ANALYSIS OF SOCIAL MEDIA POSTS

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The explosive rise of online communication especially across social media have resulted in an enormous stream of user-created posts that carry valuable emotional cues and contextual insights. At the same time, there is a growing need for accurate machine translation in low-resource languages, where traditional language models often fail due to data scarcity and limited linguistic representation. The sentiment analysis module focuses on classifying user opinions expressed in posts into categories like negative, positive or neutral. It leverages the power of contextual embeddings and transfer learning to improve accuracy across different domains and languages. Ultimately, this work contributes to bridging the digital divide in language accessibility while also extracting actionable sentiment insights from global social discourse. It is especially valuable for applications in cross-cultural communication, social media monitoring, and real-time translation in under-resourced linguistic contexts.

734.HYBRID ENSEMBLE LEARNING MODEL FOR CORONARY ARTERY DISEASE PREDICTION AND DIAGNOSIS USING LOGISTIC REGRESSION, RANDOM FOREST AND LIGHTGBM IN MACHINE LEARNING

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Coronary Artery Disease(CAD) is currently among the causes of healthcare-related disability and mortality across the world, and it should be diagnosed through proper and timely methods. The use of traditional diagnostic techniques is often limited by sensitivity and specificity and a single model (network) of machine learning might not be able to reflect all the risk factors involved in the cardiovascular condition. In this work, the hybridization of logistic regression with random forest and LightGBM algorithms are proposed to enable better prediction and diagnosis of CAD. A hybrid ensemble model combining logistic regression, random forest, and LightGBM was developed to produce high-quality gradient boosting models with improved handling of high-dimensional data. Hybrid ensemble model showed better diagnostic accuracy than the component algorithms, with accuracy rates between 82 per cent and 97.7 per cent on a variety of validation sets.

735.DEVELOPING HYPERGRAPH VISION TRANSFORMERS FOR FINE-GRAINED IMAGE CLASSIFICATION USING DEEP LEARNING APPROACH

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Fine-grained image classification (FGIC) is a difficult task because many object categories look very similar, while examples from the same class can look quite different. Vision Transformers (ViTs) can model global dependencies well but often fail to capture detailed relationships between different image regions. In this paper, we present a Hyper- graph Vision Transformer (HVT) that combines hypergraph-based reasoning with transformer layers for fine-grained classification. Local image patches are connected through a learnable hypergraph, where each hyperedge groups related regions. This helps the model understand higher-level relations within the image. The hypergraph-enhanced features are then passed through transformer layers for final classification. Experiments on standard benchmarks show that HVT improves accuracy over CNN and

transformer baselines with similar parameter counts. Visual results also show that HVT focuses on the most meaningful image parts such as textures and fine details.

736.PERFORMANCE ANALYSIS OF A RECONFIGURABLE METAMORPHIC SPIRAL ANTENNA FOR MULTI MODE AMPHIBIOUS MILITARY COMMUNICATION SYSTEMS

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In recent years, the modern military communication system used in harsh environment such as land, sea, and underwater. These antennae are not compact, flexible, and reliable. Here, the paper presents the detailed performance analysis of the reconfigurable metamorphic spiral antenna for multimode amphibious military communication systems. This antenna uses a spiral structure with meta material elements to achieve size reduction, wide bandwidth and reconfigurable frequencies. By using the HFSS tool the simulation results are produced. The Simulation results are used for the fabrication of the antenna with key performance parameters such as return loss, bandwidth, gain, and radiation pattern. The spiral antenna smaller gap between the spiral arm resulting in dual band operation with resonant frequencies at 15 GHz and 17 GHz. It as a bandwidth of 700 MHz and 2GHz, The gain of a 8.1 GHz and directivity of 9.78, demonstrating enhanced coupling and broadband characteristics. The antenna provides stable radiation patterns.

737.MODULE FOR DETECTING MALICIOUS ACTIVITIES IN CROWDSOURCED ECOSYSTEM APPLICATIONS

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In modern enterprise applications such as hospital management systems, medical retail, supply chain logistics, and social media platforms, detecting anomalous or malicious activities is crucial for ensuring data integrity and security. This study presents a practical approach to anomaly detection integrated into .NET desktop applications using the custom module on top of ML.NET machine learning framework. Our solution ingests data points from diverse systems and applies neural networks and other ML algorithms to identify unusual patterns indicative of fraud, operational issues, or unauthorized access. Leveraging custom module of ML.NET's ease of integration and cross-platform support, this approach enables real-time monitoring and rapid detection of threats, thereby enhancing overall system security and reliability. This module outputs a detailed log of suspicious activities, clearly showing time-stamped data points flagged as anomalies along with their severity/context. Users can visualize which transactions or operations were detected as threats, enabling informed decision-making and actionable security interventions.

738.HYBRID QUANTUM-CLASSICAL MODELS FOR ADMET PREDICTION

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One of the biggest and most sophisticated quantum computing architectures currently in use is the D-Wave Advantage Quantum Annealer, which is based on the Pegasus topology and allows researchers to tackle challenging combinatorial optimization problems. Models that can learn from both structured and unstructured datasets have emerged as a result of recent developments in quantum machine learning (QML). Among these, Quantum Graph Neural Networks (QGNNs) have drawn interest as a potent framework for representing information with a graph structure, like molecular graphs. ADMET (Absorption, Distribution, Metabolism, Excretion, Toxicity) characteristics are essential for assessing molecular viability in drug discovery. Even though conventional machine learning models have shown a great deal of success in ADMET prediction, they frequently fail to adequately capture the complex non-linear interactions and dependencies found in molecular structures. QGNNs provide the opportunity to better model these intricate interactions by utilizing the advantages of quantum annealing. Their performance on actual biomedical datasets has not yet been thoroughly examined, despite this promise. This work offers a methodical experimental assessment of QGNNs used for ADMET prediction tasks on D-Wave's quantum annealer. The findings highlight current issues in quantum annealing, such as noise susceptibility, qubit-embedding constraints, and encoding overhead, while also demonstrating the potential of QGNNs to improve drug discovery pipelines.

739.VOTE CASTING SYSTEM WITH AADHAR VERIFICATION USING BLOCKCHAIN TECHNOLOGY

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For democratic elections to be fair, voting procedures must be safe and clear. EVMs and other old-fashioned systems are open to problems like tampering, lack of transparency, and illegal access. This paper proposes a blockchain-based voting system integrated with Aadhaar verification to ensure voter authenticity and prevent fraudulent voting. Before allowing someone to vote, their identity is checked using biometric data linked to

Aadhaar. Smart contracts make sure that each user can only vote once and that the results are counted automatically. Blockchain, on the other hand, makes sure that votes can't be changed. The system uses IoT connectivity to safely send voting data to the cloud without anyone else being able to get in the way. Cryptographic methods keep voters' information and ballots secret.

740.DEEPTRUST: SEMANTIC-AWARE FAKE REVIEW DETECTION USING HYBRID TRANSFORMER EMBEDDINGS AND ENSEMBLE CLASSIFICATION

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User-generated reviews have become one of the most trusted sources of product information in today's e-commerce landscape, yet the growing presence of fake and paid reviews continues to erode consumer trust and distort market outcomes in measurable ways. Approaches that rely purely on handcrafted text features or isolated deep learning models tend to struggle with generalization across different platforms, are sensitive to skewed class distributions, and often miss the subtle manipulation techniques used by experienced spammers. In this work, we introduce DeepTrust, a detection framework that brings together transformer-derived semantic representations, hand-crafted linguistic features, and Random Forest-based ensemble classification into a single, coherent pipeline. At the core of our approach is the DeBERTa-base model, which we use in a frozen, inference-only mode to produce mean-pooled contextual embeddings. These embeddings are then concatenated with a compact, seven-dimensional feature vector capturing stylistic signals that we hypothesize are indicative of deceptive writing behavior. Experiments were conducted on a merged dataset of 1,200 labeled reviews drawn from multiple publicly available sources. Our system achieved an overall accuracy of 82.67%, a macro F1-score of 0.81, and a precision of 0.89 on the fake class—results that compare favorably to both traditional and transformer-only baselines, while remaining practical enough to deploy in real-time filtering contexts.

741.AI-POWERED SYSTEM FOR DETECTING GASTROINTESTINAL DISEASES WITH EXPLAINABLE INSIGHTS

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Gastrointestinal (GI) diseases affect millions worldwide and require early detection to prevent serious complications. Traditional diagnostic methods are manual, time-consuming, and prone to human error. Existing AI-based models focus mainly on single-label classification and lack interpretability. AI-powered system for multi-class detection of GI diseases from endoscopic images and videos. The system uses deep learning EfficientNet for classification and Grad-CAM for explainable visualization. Trained on Kvasir dataset ensuring diverse and high-quality medical imaging coverage. Incorporates data augmentation and transfer learning to improve accuracy and generalization. Provides severity scoring and disease-wise reports for assisting doctors in diagnosis.

742.DEEP LEARNING-BASED FRAMEWORK FOR CALORIE ESTIMATION OF FOOD AND BEVERAGES USING IMAGE ANALYSIS

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The dietary monitoring and health management depends on the proper estimate of food and beverage images calorie content. The conventional calorie record systems are largely manualized and thus time-consuming, prone to errors and incapable of being used in the long-term. To address these shortcomings, the paper presents a deep learning-based solution to automated food recognition and approximating the content of calories in the food through image analysis. The system proposed applies convolutional neural network, which is built on the ResNet architecture, with transfer learning which is used to obtain discriminative visual features on food images effectively. Image processing methods, such as resizing, normalization, and data augmentation, are implemented to increase the resistance to the change in lighting conditions, view angles, and food presentation. The activities that are extracted can be used to properly classify food and beverages in categories. These identified classes of foods are then cross-mapped to a nutritional data bank of standardized per-100 gram caloric values in estimating the intake of calories. The design that is based on classification ensures scalability and can be easily extended to new categories of food without significant architectural modification. The framework can be used to make real time inferences and can be incorporated into mobile and web-based applications to assist in making efficient dietary assessment and nutritional decision making.

743.REAL-TIME MULTIPLAYER COMPETITIVE CODING PLATFORM WITH AI-POWERED LEARNING SUPPORT: A COMPREHENSIVE LITERATURE REVIEW

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The growing need for engaging and efficient coding platforms has driven the rise of modern competitive programming ecosystems. While these platforms enhance coding skills and community learning, many still face key challenges—traditional ELO systems often disadvantage beginners, and most lack scalability for real-time multiplayer contests. This study reviews major research on competitive systems, AI-assisted learning, and scalable code execution frameworks, proposing a Microservice Architecture with tools like Judge0 for secure, multi-language execution. It also highlights the motivational power of gamification through badges, streaks, and

leaderboards. Furthermore, integrating large language models as “Code Coaches” can enable personalized guidance and feedback. Combining these insights, this paper introduces CodeQuest – Code Smart, Win Fast, a next-generation platform built to deliver fair, adaptive, and motivating coding experiences for learners and competitors alike.

744.MEDVISION: A DEEP LEARNING SYSTEM FOR INTERPRETABLE AND CONTINUOUSLY IMPROVING MEDICAL DIAGNOSIS

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Nowadays artificial intelligence and deep learning have become more important for medical analysis. They help in fast and accurate disease prediction. Our project presents a medical image classification which is built with the ResNet-18 model. It uses X-ray and MRI images to classify the disease category and its prediction including tuberculosis , pneumonia etc. Basically our model is trained on preprocessed medical images resized to 224 x 224 pixels and normalised for uniform input. Also, we used transfer learning with ImageNet pretrained weights. Finally, we fine-tuned the final classification layer for specific medical classes. And this training process includes categorical cross entropy loss and the Adam optimiser. Our system uses a Grad-CAM heatmap to highlight the areas which are affected by disease. This helps, preferably, doctors for AI predictions. The feedback mechanism helps the clinician review and correct the result. Our system gets more than 90 per cent when it looks at standard datasets. Also, it rectifies if the data is not present, has no clear picture, and if it makes mistakes. So based on the intelligence, it can explain clearly to doctors. Therefore, this makes classifying medical images easier and more trustworthy.

745.SMART DRONE POTHOLE SURVEILLANCE SYSTEM

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The structural integrity of road networks is paramount for urban mobility, economic growth, and public safety. Traditional road maintenance relies heavily on manual inspections or localized complaint-driven repairs, both of which lack the scalability and objectivity required for modern smart cities. In this research, we propose a comprehensive, end-to-end Smart Drone Pothole Surveillance System that leverages Unmanned Aerial Vehicles (UAVs) coupled with advanced computer vision algorithms. By transitioning from generic image classification to fully quantified geospatial analysis, the proposed framework integrates YOLOv8 for real-time, high-accuracy object detection and MiDaS for monocular depth estimation. To address the inherent challenge of measuring scale from aerial imagery without physical reference objects, we implement an Inverse Perspective Mapping (IPM) geometric transformation to compute real-world pothole surface areas. A novel Pothole Severity Index (PSI) is formulated to mathematically prioritize maintenance schedules based on depth, area, and location severity. Furthermore, a GPS haversine clustering algorithm is deployed to prevent duplicate logging of continuous video streams, supported by a Human-in-the-Loop (HITL) verification layer. Field experiments utilizing the Road Damage Dataset (RDD) and real-time drone streams demonstrate that the proposed architecture achieves a mean Average Precision (mAP) of 83.4% at 45 Frames Per Second (FPS). A Streamlit-based Command and Control dashboard serves as the final analytical layer, providing municipal authorities with actionable, deduplicated, and verified smart-city infrastructure intelligence.

746.REAL-TIME SENTIMENT ANALYSIS USING NLP TO ENHANCE USER SERVICE

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\n In the contemporary digital landscape, organizations receive large volumes of unstructured customer feedback from social media platforms, e-commerce portals, and support channels. Traditional batch-processing sentiment analysis systems fail to provide real-time contextual understanding and actionable intelligence. This paper presents a scalable Real-Time Transformer-Based Sentiment Analytics Framework designed to enhance intelligent customer engagement. The proposed system integrates transformer architectures such as BERT and

XLNet with streaming technologies including Apache Kafka and Spark Streaming to enable low-latency sentiment classification across multiple data sources. The framework processes structured and unstructured inputs through advanced preprocessing techniques including tokenization, lemmatization, negation handling, and class balancing. Experimental evaluation was conducted on a dataset comprising 499 labeled records along with extended live- streaming data from Twitter, Amazon product reviews, and customer support forums. The XLNet-based classifier achieved an overall classification accuracy of 92.6% with an F1-score of 0.89, outperforming rulebased baselines such as VADER and TextBlob. The deployed system demonstrated an average inference latency ranging between 180 ms and 240 ms across datasets and sustained throughput exceeding 1,000 sentiment predictions per minute under load testing. A continuous feedback loop with periodic retraining every 15 days ensures adaptability to evolving linguistic patterns and emerging slang, while integrated monitoring tools support drift detection and system reliability. The results validate the framework's effectiveness in delivering scalable, context-aware, and real-time sentiment intelligence suitable for enterprise-grade customer engagement systems.

747. QUANTUM INTELLIGENCE PLATFORM: A HYBRID QUANTUM-INSPIRED FRAMEWORK FOR INTELLIGENT DECISION PREDICTION AND OPTIMIZATION

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The rapid advancement of artificial intelligence (AI) and quantum computing has introduced new paradigms for solving computationally complex problems beyond the capabilities of classical systems. This paper presents a Quantum Intelligence Platform (QIP), a hybrid quantum-inspired computational framework designed to enhance intelligent decision prediction and optimization in complex environments. The proposed system integrates quantum probabilistic modelling concepts such as superposition and interference with classical machine learning algorithms to improve prediction accuracy and adaptive decision-making. A hybrid architecture combining quantum circuit simulation and classical deep learning modules is developed to enable scalable experimentation without requiring physical quantum hardware. The platform is evaluated on decision prediction and optimization tasks, demonstrating improvements in convergence stability and predictive performance compared to conventional models. Experimental results show that quantum-inspired state representation enhances feature expressiveness and probabilistic reasoning. The proposed framework bridges the gap between theoretical quantum computation and practical intelligent systems, offering a scalable pathway for future quantum-enhanced AI applications.

748.SINGLE PHASE INTERLEAVED BOOST CONVERTER BASED ONBOARD EV CHARGER WITH MPC CONTROL

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Electric vehicle (EV) onboard chargers demand high efficiency, fast dynamic response, and excellent power quality. This paper presents a single-phase interleaved boost converter topology integrated with Model Predictive Control (MPC) for enhanced EV charging applications. The interleaving technique reduces input current ripple, improves thermal distribution, and increases overall efficiency. A detailed mathematical model is derived using state-space averaging. The MPC strategy optimizes transient response and minimizes steady-state error compared to conventional PI control. Simulation results demonstrate improved settling time, reduced overshoot, lower ripple content, and increased efficiency (97%). The proposed system satisfies IEEE power quality standards and is suitable for next-generation EV charging systems.

749.NUTRIFUSION: AN INTELLIGENT MULTI-MEDICAL PERSONALIZED NUTRITION RECOMMENDATION SYSTEM

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Clinically grounded decision-support tools that extend beyond simple calorie counting and generic dietary guidelines are essential for personalized nutrition. Existing digital diet systems primarily emphasize macronutrient optimization and biomedical metrics, often overlooking constitution-based and preventive dietary frameworks. This paper presents NutriFusion, an AI-powered clinical nutrition platform that integrates structured principles from Traditional Chinese Medicine, Ayurveda, and Unani with modern nutritional science. The proposed system employs a hybrid architecture combining rule-based traditional dietary reasoning with supervised machine learning models to enable adaptive personalization. A unified food knowledge graph links constitutional classifications such as Dosha, Mizaj, and Yin–Yang with micronutrient composition, metabolic markers, and disease-specific dietary constraints. The platform supports longitudinal monitoring through integration with wearable health devices and user adherence feedback, enabling dynamic recalibration of dietary recommendations. Preliminary evaluation demonstrates improved personalization accuracy, enhanced cultural alignment, and higher adherence rates compared to conventional nutrition applications, supporting its potential for preventive and constitution-aware digital health management.

750. SENTRIMARK: NEXT-GEN ATTENDANCE WITH DEEP AUTHENTICATION

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Secure and tamper-resistant attendance validation in distributed and security-conscious settings is still an open challenge due to location spoofing, biometric attacks, device compromise, and context uncertainty. Conventional attendance systems are based on deterministic authentication approaches that consider individual security parameters as binary values, which are prone to single-point failures and malicious attacks. This paper proposes SentiMark, a trust score-driven and risk-adaptive attendance validation framework that moves the authentication paradigm from strict rule enforcement to confidence-based estimation. The proposed framework calculates a dynamic trust score for each attendance event by combining multi-dimensional security features such as geofencing accuracy, liveness-robust facial recognition confidence, device integrity verification, behavioral biometric characteristics, temporal constraints, network conditions, and past attendance behavior. An interpretable decision-making module leverages the trust score to validate attendance, raise anomaly alerts, or initiate step-up authentication. The security framework also incorporates advanced security features such as mock location detection, root and emulator detection, continuous presence authentication, and offline-secure synchronization. Experimental results show enhanced spoofing and context attack resistance compared to conventional rule-based attendance systems. The proposed framework provides a scalable and security-focused architecture for next-generation attendance management systems.

751.IOT – INTEGRATED ADAPTIVE EDGE INTELLIGENCE FOR PREDICTIVE DIAGNOSTICS IN SMART INDUSTRIAL ENVIRONMENTS

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In the contemporary industrial set-ups, continuous running of machines is an indispensable characteristic of ensuring that productivity is not wasted with unnecessary costs of operation. The sudden malfunctioning of equipment would cost the company time in production, costly maintenance, and high-energy use. This paper proposes an Adaptive Edge Intelligence- based predictive diagnostic system to smart industrial applications in order to solve these challenges. The suggested framework constantly receives sensor data in real-time including temperature, vibration, and machine speed. As opposed to sending the raw data to the cloud, a local preprocessing, noise removal, feature extraction, and anomaly detection are performed on an edge device directly near a machine. This edge process reduces the communication latency, and guarantees stable working even in unstable network conditions. The system will have a mechanism of adaptive learning that will dynamically update diagnostic patterns with changing machine behavior, operating conditions, and wear

characteristics. The IoT application of the Thing Speak cloud platform allows remote monitoring of the machines and their health parameters graphical visualization in a secure way. Once abnormal trends are detected, early warning signals are produced to facilitate prompt decisions made in maintaining them. The experimental results indicate that the suggested solution will help to improve the accuracy of fault prediction and decrease the time of response in comparison with the traditional systems of cloud centered monitoring. In general, adaptive edge intelligence and Think Speak visualization can be considered an effective, efficient and reliable tool of predictive maintenance, resulting in a decrease in the down time, enhanced safety and improved productivity within the industry.

752.DESCRPTION OF POWER FRAMEWORK: TYPESCRIPT BUSINESS OBJECTS

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The POWER Framework supports higher-level system construction through automated website generation from Software Requirement Specifications (SRS) using natural language processing techniques, as well as a code converter design pattern enabling interoperability among multiple programming languages. Experimental implementation results demonstrate that the proposed framework significantly improves separation of concerns, unit testability, and system extensibility compared to conventional object-oriented approaches. The POWER Framework further encourages the construction of high-level systems by means of the automatic generation of websites from Software Requirement Specifications (SRS) using natural language processing techniques as well as a code converter design pattern that facilitates the use of multiple programming languages. The results of the experimental implementation indicate that the proposed framework is much better than the traditional object-oriented approaches in terms of separation of concerns, unit testability, and system extensibility. The framework is especially appropriate for large-scale, configurable, and evolvable enterprise applications that are created in Typescript.

753.INTELLIGENT DETECTION OF EXTERNAL VEHICLE DAMAGE USING YOLO FOR AUTOMATED INSPECTION

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Automated vehicle damage assessment has become increasingly essential as manual inspection methods remain slow, labor-intensive, and prone to human error. This paper proposes an intelligent car damage detection system based on the YOLOv8 deep learning model to enable fast, accurate, and automated visual inspection. A dataset of 985 annotated vehicle images containing dents, scratches, broken lights, damaged windows, and bumper defects was prepared using Roboflow for high-quality bounding-box annotations. The model was trained using

optimized hyperparameters and evaluated through precision, recall, IoU, and mAP metrics. Experimental results show that YOLOv8 achieves a precision of 0.994, recall of 0.997, and mAP@50 of 0.9949, outperforming YOLOv7 and EfficientNet benchmarks. The system demonstrates strong potential for deployment in insurance claim processing, workshop diagnostics, and fleet management applications. Future work will integrate multi-angle analysis and edge-device deployment for improved real-world scalability.

754.DEEP LEARNING AND MACHINE LEARNING BASED AUTOMATED DETECTION OF VERTEBRAE DISORDERS FROM X-RAY IMAGES

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Vertebral disorders can lead to reduced mobility, structure problems, and long-term pain if not detected and diagnosed correctly. More than often, X-ray imaging is used to evaluate the spine because it is relatively cheap and readily accessible; however, manual interpretation of the X-ray images is subjectively done and is inconsistent between interpreters. Therefore, in this research project, an automated deep learning system is proposed to detect X-ray images of vertebral disorders. The application of Convolutional Neural Networks (CNNs) is to identify important anatomical features, with the additional purpose of categorizing pathological conditions reliably; whilst, machine-learning methods aid in making decisions based on this data. The Grad-CAM algorithm supports model interpretation, building clinician trust by highlighting specific regions of the input image that contributed to predictions. By enhancing diagnostic accuracy, interpretability, and accessibility of CNNs, the proposed method is well positioned for assisting with making clinical diagnoses of vertebral pathologies.

755.MINDSCOPE – AI-BASED EARLY MENTAL STRESS DETECTION

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Mental stress in individuals, especially students, often goes unnoticed. This is primarily due to the lack of early detection mechanisms. This Mindscope system introduces an AI-driven framework using privacy-preserving smartphone sensing to predict stress at early stages. MindScope analyzes behavioral indicators such as typing latency, night-time device engagement and app switching behavior. The framework combines long short-term memory (LSTM), Isolation Forest anomaly detection and ensemble methods to model deviations of user's digital rhythm. This hybrid approach is designed for digital environments and offers a non-intrusive and scalable solution for early stress detection.

756.AI BASED MENTAL HEALTH CARE SUPPORT

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Providing timely and confidential mental health support to students can be a difficult task given that the conventional counseling systems are often not equipped with features like accessibility, continuous monitoring, and privacy-preserving mechanisms. Quite a number of students do not recognize their early emotional distress signals and those who do, generally, are reluctant to go for professional help due to the stigma and fear of data exposure. In the currently available systems, mental health data is either managed manually or stored on centralized platforms, which

makes it difficult to scale while also raising issues of data privacy and trust. Through encryption, anonymization, and consent-based access control data security, and privacy is honored to a very high degree. Student interaction data is confidentially handled and stored so that privacy is maintained but at the same time transparency and accountability are not compromised. The proposed solution, by virtue of being a non-judgmental, always available, and privacy-aware support system, overcomes the mental health care access barrier and facilitates timely intervention.

757.INFANT CRY CLASSIFICATION USING ENTROPY AND DYNAMIC TIME WARPING FEATURES WITH MACHINE LEARNING AND DEEP LEARNING MODELS

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The vocalization of an infant's cry provides a wealth of information about the baby's needs and physical condition. However, analyzing baby cries by hand is a subjective process that might not always be reliable. This study suggests a technique for classifying baby cries that makes use of comparative modeling and acoustic feature analysis. To obtain equal samples, the audio signal of baby cries is preprocessed using segmentation and normalization. Dynamic Time Warping (DTW), which uses single-template and multi-template techniques to measure the temporal similarity of cry patterns, and entropy, which quantifies the fluctuations in the signal's complexity, are used to extract features. Entropy features, DTW features, and their combination are used to compare different classification models, including CNN- BiLSTM, LSTM, and MLP. The experimental study demonstrates how various feature representations and model designs impact the classification outcomes, demonstrating that feature combinations yield more representative information than single features.

758.A SECURE AND PRIVACY-AWARE CROWD SAFETY SYSTEM FOR EARLY PREVENTION OF STAMPEDE INCIDENTS AT PUBLIC EVENTS

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Gradual crowd instability and over-density are the causes of stampede incidences in a public gathering; these factors are life-threatening and not the sudden interruptive activities. Conventional surveillance systems are mostly based on analysis of events, which does not provide intervention after the event. This paper is a proposal of a real-time crowd safety system that combines spatio-temporal activity detection and area-aware density detection and track of the occurrence of unsafe conditions until apparent panic occurs. The object recognition, frame adaptation, and convolutional neural network are used on the live video streams to detect abnormal behavior efficiently. Behavioral detection should be accompanied with the use of an area to person ratio measure that gives proactive warnings in case the occupancy surpasses safety levels. The results of experimental assessment of standard crowd datasets have shown that it has a high detection rate with a small amount of computer load to compute, applicable to preventive safety systems, privacy-minded information gathering, and feasible use on large crowds of people in large events.

759.A TRANSFORMER-BASED APPROACH FOR REAL-TIME HATE SPEECH AND OFFENSIVE COMMENTS DETECTION

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With the rampant proliferation of numerous social media, hate speech and offensive content are increasingly on the rise, and there are corresponding societal and psychological concerns as well. Manual moderation of content may not be enough to address these proliferation challenges that are fast developing in real-time. In that respect, we have designed and enhanced a real-time hate speech detection system based on transformers that can easily integrate into a Twitter-like social media interface. A detailed explanation of these developments, including how we can classify content into hate, offensive, or even neutral, can be found in this paper, as well as our experiments, in addition to how we were able to reduce latency as well. For that purpose, we have also designed an architecture, including how we can build and deploy it, as well as our experiment on it, and how we can adapt it to our set objective of developing the system of interest, that can easily deploy it into a real-time setting.

760.SKINTHESIS - A HYBRID ML BASED PERSONALIZED SKINCARE ANALYSIS AND PRODUCT RECOMMENDATION USING FACIAL IMAGES

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Personalized skincare recommendation systems have gained significant attention because of the need for personalized skincare. Conventional skincare recommendation systems commonly employ generalized rules or manual evaluations, which fail to provide precise accuracy or personalization. In this paper, a machine learning-based intelligent skincare analysis and recommendation system based on image analysis of the face to automatically detect personal skin problems and recommend appropriate skincare products is proposed. For personal skin concern analysis, this system uses a lightweight ConvNet model, namely EfficientNet-B0, to automatically extract deeper-level features using input facial images of a human face. For improved recognition, this paper applies K-Means clustering to effectively categorize images representing similar skin features. For personalized product recommendation, this system adopts a hybrid model along with collaborative filter-based recommendation to suggest personal skincare products. The proposed system uses cosine similarity to identify eligible products to each one of its users. Finally, by incorporating appropriate rules within its machine learning model, this system automatically recommends personalized skincare routines that consider extensive dermatologic rules. The results show promising accuracy along with high personalization to recommend personal skincare to users.

**761.SECUREVISION-PRO: A REAL-TIME AI
SURVEILLANCE SUITE FOR VIOLENCE, HAZARD, AND
SAFETY DETECTION WITH AUDIO-VISUAL INTELLIGENCE**

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The surveillance systems are believed to be very effective in keeping the people safe and the operations safe, but most of the conventional systems are merely the monitors and lack multiple modes and real time on the threat detection end. This paper presents the prototype which is an artificial intelligence AI -based surveillance system called SecureVision-Pro that merges visual and audio based methods of detecting an incident in a holistic and accurate way. It relies on the YOLOv11 to identify real-time violent activities, fire, smoke, and falls, as well as personal protective equipment PPE violation with the help of strong facial-recognition engine DeepFace and violent audio gunshots, screams, explosions, etc. detection with the help of Librosa-based models. The live CCTV streams, webcams, recorded video, and the audio streams will be easily processed with a modular architecture. The output layer offers annotated visual feeds, multi-channel real-time alerts and structured email and audio alerts through the form of JSON reports. Experimental analysis shows that the multi- modal fusion methodology is significantly superior at decreasing the false alarms, maintaining consistent frame rates and constant load, and producing alerts with a low- latency. The findings of these tests are the predeterminants of the inclusion of SecureVision-Pro in the list of the potential solutions to the issue of monitoring the smart cities and controlling the safety of industries, along with home surveillance.

762.HYBRID CLUSTERING – DRIVEN ATTENTION NETWORK FOR ENHANCED TIME SERIES FORECASTING

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Time Series Forecasting has been researched extensively, yet predicting time series with big variances and extreme events remains a challenging problem. Extreme events in reservoirs occur rarely but tend to cause huge problems, e.g., flooding entire towns or neighbourhoods, which makes accurate reservoir water level prediction exceedingly important. In this work, we develop a novel extreme-adaptive forecasting approach to accommodate the big variance in hydrologic datasets. We model the time series data distribution as a mixture of both point-wise and segment-wise Gaussian distributions. In particular, we develop a novel end-to-end Hybrid Clustering – Driven Attention Network model for univariate time series forecasting, which we show is able to predict future trends and their behaviour effectively. This model consists two modules a) a grouped auto-encoder based forecaster (AEF) and b) a mixture clustering based learnable weights attention network (WAN) with an attention mechanism. The WAN component is crucial, skilfully adjusting weights to distinguish data with varying distributions, enabling each AEF to concentrate on clusters of data with similar characteristics.

763.MULTILINGUAL HOPE SPEECH DETECTION USING TRANSFER LEARNING MODELS

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Health specialists emphasize that hope plays a vital role in an individual's well being, recovery, and overall restoration of human life. Hope speech reflects the belief that people can find pathways toward their goals and remain motivated to pursue them. With the rapid growth of the Internet, social media platforms have become spaces where individuals actively seek emotional support, encouragement, and reassurance. In this context, hope speech refers to textual expressions on social media that evoke positive emotions, resilience, and optimism among users. Through this project, we aim to detect Hope Speech that reinforces positivity in online environments. This problem is particularly relevant because, along with identifying and penalizing harmful or negative content, it enables the recognition and encouragement of positive contributors. By effectively identifying such content, platforms can reward good actors and promote healthier online interactions. In this paper, we experiment with various Machine Learning (ML) and Deep Learning (DL) techniques and analyze the results obtained. All codes and experimental details are made publicly available for reproducibility and further research.

764.REPAIRGO: AI-DRIVEN MULTI-DOMAIN REPAIR COORDINATION WITH INTELLIGENT TECHNICIAN SELECTION AND WORKFLOW AUTOMATION

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In smaller towns, still, it is difficult to locate fast and quality repair services of ones electronics, car, home-appliance, and simple household problems. Most of the existing platforms either specialize in a category, rely on a manual technician selection system, lack real-time tracking or instant booking which leads to long waiting time and lack of consistency in service quality. RepairGo is a solution to such constraints because it combines the on- demand repair model with smart technician matching. When one makes a request, the system examines the abilities, the place, availability, and previous performance of the technicians and places the correct technician automatically. The user is also able to follow the direction of the technician in real-time GPS just like

most of the modern ride-hailing applications. There is another emergency mode that enables quick mobilization to do urgent repair. In-app payments are available to the users, as well as optional subscriptions to enhance convenience and long-term reliability. Without reducing the service accuracy, RepairGo should have shorter waiting periods as well as transparency compared to other solutions. Through this approach, scalable and realistic repair ecosystem can be availed, especially to the Tier-2 and Tier- 3 regions that are so far dispersed.

765.NEXT-GEN AI-DRIVEN MOCK INTERVIEW PLATFORM WITH REALISTIC PRACTICE AND REAL TIME FEEDBACK

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Interview preparation is an essential part of professional development; yet, traditional methods of mock interviews are often unrepresentative, scalable, and uninformative. In the latter part of the previous decade, there have been attempts by various studies at researching the utilization of Artificial Intelligence in the area of recruitment and interview evaluation. The current state-of-the-art in AI-based recruitment tools is mainly represented by the application of AI in screening resumes, conducting chatbot-based interviews, and text/speech analysis-based evaluation of candidates. Although there are platforms that apply Natural Language Processing in analysing text-based input and platforms that apply speech recognition in verbal evaluation methods in AI-based recruitment tools, they all tend to have certain severely limiting constraints. To address these issues, this paper presents an AI-based mock interview system that provides realistic interview simulations using a hybrid technique, combining both AI-based interviews and actual HR-based interviews in real time. The system

automatically adapts interview queries using Large Language Models based on candidate roles, skill areas, and candidate performances. The interview queries are rendered through Text to Speech technology, and candidate answers will be analyzed through Automatic Speech Recognition technology, with answers converted into text. Sophisticated NLP is used to assess responses on numerous parameters such as relevance, understandability, fluency, effectiveness of communication, as well as confidence. The solution provides rich feedback to users through performance analysis scores and personalized reports to help them work on their performance. When human HR resources are not available, AI-systems are capable of automatic interviews without interruption. However, when intelligence is added to automation, increased interview preparedness, communication skills, as well as confidence, can be achieved, leading to an effective process for recruitment preparation.

766.CLOUD BASED BABY INCUBATOR CONDITION MONITORING AND ALERT SYSTEM

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This paper presents the design and implementation of a comprehensive, cloud-based smart monitoring and alert system for infant incubators, leveraging Internet of Things (IoT) architecture to enhance neonatal care. The system integrates multiple sensor modules—including a DHT11 sensor for ambient and skin temperature monitoring, a photoplethysmography (PPG)-based pulse sensor for real-time heart rate measurement, a sound detection module for identifying infant cry patterns, and a rain-drop sensor for wet bed detection—all interfaced with an Arduino UNO microcontroller. The acquired physiological and environmental parameters (body temperature, pulse rate, cry events, and bed dampness) are displayed locally on an LCD and transmitted via a GSM SIM900 module to a cloud platform. The system implements a two-tier alert mechanism: primary SMS notifications containing critical data (e.g., abnormal pulse range, elevated temperature, cry detection) with incubator ID are sent to caregivers or nurses, followed by an automated voice call as a secondary alert to ensure timely response, particularly during night shifts. By providing continuous, remote monitoring and immediate automated alerts, this IoT-based prototype aims to mitigate risks associated with manual oversight, create a stable, incubator- controlled microenvironment, and ultimately improve the safety, health outcomes, and

management efficiency for neonates, especially in challenging environments and pandemic conditions where physical presence is limited.

767.MACHINE LEARNING-BASED COPLANAR MICROSTRIP PATCH ANTENNA DESIGN FOR LUNG CANCER DETECTION

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Microstrip patch antennas have been extensively employed in the last few years in the biomedical field because they are relatively small, cheap, and do not interact with human tissues. As part of this project, the design and optimization of a rectangular patch of microstrip material to work at 2.4 GHz ISM band with non-invasive lung cancer detection was given. The anthropomorphic model used is a realistic multilayer lung model which is used to analyze the electromagnetic interaction between healthy and cancerous tissues in connection with the antenna. Tumors in the lung change dielectric properties of the lung and cause measurable changes in resonant frequency and the reflection coefficient (S_{11}). Increasingly, parametric optimization of the antenna dimensions is conducted to give minimum S_{11} and perfect frequency resonance to aid in detecting more. Data in frequency format and S_{11} data obtained at CST simulations are normalized to create a dataset to be analyzed. An automated algorithm and machine learning-based system that is implemented as k-Nearest Neighbors (kNN) algorithm is used to identify the presence of healthy and cancerous lungs, which can be effectively classified in relation to the parameters of the antenna. The optimized antenna is of better sensitivity with stronger S_{11} minima and greater gain and directivity towards the lung area. The outputs of the simulation prove that the integration of machine learning with the design of the antenna is a valid, conservative, and non-invasive method to detect lung cancer, which will contribute to the creation of sophisticated biomedical diagnostic machines.

768.EFFIHMSA-UNET: ADAPTIVE CONVOLUTION WITH STAGE-WISE CHANNEL ATTENTION FOR MULTI-MODAL MEDICAL IMAGE SEGMENTATION

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Accurate medical image segmentations are essential for clinical diagnosis, surgical planning, and treatment monitoring, but still it remains challenging in heterogeneous and highly imbalanced multi-modal datasets where pathological regions occupy a small fraction of the images. To resolve these issues, this paper proposes EffiHMSA-UNet, a U-Net-based segmentation framework that integrates an EfficientNet encoder with an adaptive convolutional decoding and channel attention modules applied at multiple encoder-decoder stages. Adaptive convolutions dynamically adjust to the input feature distributions, while attention modules refine the channel-wise responses to improve the localization of small and low-contrast structures. To mitigate the severe class imbalance, the model employs a composite Focal- Tversky loss in the conjunction with a weighted random sampling strategy during the training. Computational efficiency and training stability are furthermore improved through the mixed- precision training and gradient clipping. Experimental evaluation which is conducted on CT, Ultrasound, and X-ray datasets demonstrates the improved segmentation accuracy in the terms of Dice coefficient, Intersection over Union, precision, recall, and F1-score. Qualitative visualizations further confirms accurate delineation of organ boundaries and lesions across the imaging modalities, indicating that EffiHMSA-UNet provides a reliable solution for the multi-modal medical image segmentation.

769.BRIDGEMEND: FROM CONFLICT TO CLARITY

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Conflicts in relationships have become more prevalent in modern society due to rising levels of stress, breakdowns in communication, and differences in lifestyles. Many couples do not have access to neutral, timely, and affordable support to resolve these problems. This project introduces an AI-driven platform for relationship counselling that can help couples understand and resolve their issues through intelligent, private, and guided interactions. The main features of this application include a live, AI-mediated session where both partners can communicate with each other in the presence of an intelligent, third-party agent and personal, one-to-one, encrypted chat to separately seek advice or emotional support. The system is driven by an advanced AI counselling engine that uses NLP, sentiment analysis, and ML to capture user emotions, detect the pattern of conflicts, and hence come up with real-time, context-aware recommendations. The AI model is structured into two agents, one for the husband and one for the wife, to maintain privacy, while enabling holistic conflict analysis through shared session data. Each agent learns from both personal and joint interactions, continuously improving through data-driven insights derived from millions of relationship case studies. This system will be aimed at fostering healthy communication, emotional awareness, and problem-solving among couples. By merging the power of AI, ML, and psychology- inspired counselling, the app offers an accessible, non-judgmental, and effective way of maintaining long-term relationship harmony.

770.DUTY SWAP: REALLOCATION SYSTEM FOR STRESS JOBS

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The increasing occurrence of stress-related incidents such as burnout, suicide attempts, and workplace complaints among police officers and frontline workers highlights the urgent need for proactive health and duty management solutions. This paper presents a Smart Duty Swap System that integrates real-time health monitoring with intelligent duty reassignment to enhance workforce safety and operational efficiency. The

system continuously monitors vital physiological parameters, including heart rate, SpO₂ (oxygen saturation), and body temperature, using biomedical sensors. The collected data is processed by a microcontroller, displayed locally for immediate reference, and transmitted to an AI-based analysis module. This module evaluates the health parameters against predefined threshold values to determine an individual's fitness to continue assigned duties. Upon detecting abnormal conditions, the system automatically initiates a duty swap request through a webbased application, notifying available and medically fit personnel. Once accepted, the duty is reassigned seamlessly without administrative intervention, ensuring uninterrupted operations. By proactively identifying health risks and reducing stress- induced workload, the proposed system improves workplace safety, minimizes fatigue-related errors, and promotes overall well-being. The solution is particularly applicable to high-pressure environments such as law enforcement, where sustained alertness and physical stability are critical for public safety and effective operations.

771.AGENTIC AI AND AUTOMATION FOR INDUSTRY WORKFLOWS

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The rapid evolution of Industry 4.0 has increased the complexity of industrial workflows, particularly in the furniture industry, where order processing, inventory management, supplier coordination, and fulfillment planning involve heterogeneous data sources, high product variability, and frequent exceptions. Conventional workflow automation and robotic process automation systems are largely rule-based and operate under static logic, limiting adaptability and requiring human intervention when conditions change. To overcome these limitations, this paper proposes an agentic artificial intelligence–driven framework for intelligent workflow automation tailored to the furniture sector. The system adopts a collaborative multi-agent architecture in which autonomous AI agents perform data acquisition, contextual reasoning, decision-making, and automated workflow execution across distributed enterprise environments. Large Language Models (LLMs) are integrated within the agentic layer to enable contextual understanding, adaptive reasoning, and explainable decision generation. Workflow execution is implemented through API-driven orchestration mechanisms that ensure seamless integration with enterprise resource planning platforms, inventory systems, and communication services. The framework is evaluated using a real- world furniture e-commerce dataset and simulation-based workflow scenarios reflecting practical industrial conditions. Performance is assessed using metrics such as automation coverage, workflow execution time, and decision accuracy. Results demonstrate that the proposed agentic AI framework significantly enhances operational efficiency, reduces manual intervention, and improves decision reliability compared to traditional rule-based automation approaches, establishing agentic AI as a scalable foundation for next-generation intelligent industrial automation.

772.GENERATIVE ADVERSARIAL NETWORK-BASED REVERSIBLE DATA HIDING FOR SECURE AND ROBUST IMAGE STEGANOGRAPHY

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Reversible data hiding (RDH) is crucial in secure communication of images where the hidden secret message may be recovered and the original cover image retrieved in full without deformities. The traditional RDH methodologies can be characterized by a trade-off between the embedded capacity, visual quality, and the ability to resist detection. In order to address these constraints, this paper suggests a Generative Adversarial Network (GAN)-based reversible data hiding model that can be trained to minimize visual imperceptibility and maximize data recovery precision. The generator is trained to learn to inject hidden messages in image representations and yet perceptually similar to the original images and the discriminator is trained to learn visual realism using adversarial learning. Reversible extraction module is used to recover the hidden data together with

the cover image fully. The experimental assessments confirm that the model proposed has good Peak Signal-to-Noise Ratio (PSNR) and Structural similarity Index Measure (SSIM) over the traditional RDH and deep steganographic methods, which are robust to noise and compression attacks. The findings emphasize the success of the suggested approach in offering a secure, high- fidelity, and invertible image steganography framework that can be used in contemporary multimedia usage.

773.IOT BASED AI POWERED NPK TESTER FOR CROP

MANAGEMENT

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The contemporary farming has introduced numerous transformations to the farming process and there is no fertilizer use. Conversely, the productivity problem needs effective control.soil health. The utilisation of fertilisers, which has been traditionally relied on is normally subject to generalised suggestions which results into nutrient imbalance and poor output. The report provides a distinct smart NPK (Nitrogen, Phosphorus, Potassium) Prediction Model on the usage of machine learning to precise and precise fertilizers prescriptions. Significant soil and Environmental parameters such as PH, water content, temperature, rainfall and type of crops will be used as well to predict the optimum NPK nutrient requirements with this model. A predictive model is trained through supervised learning. means of perceiving trends in previous agricultural data. The system will proceed to suggest the appropriate fertilizers and quantities of the fertilizer to the farmer, depending on these values of NPK. This solution offers a practical, efficient, and farmer-centered solution by integrating the data preprocessing, feature selection, precise prediction, and real-time recommendations in a single roof and improving the agriculture productivity and sustainable agricultural practices.

774.PERFORMANCE ANALYSIS OF SYMMETRICAL CMOS OTA WITH BULK DRIVEN CIRCUIT FOR ECG APPLICATIONS

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There's been a lot for biomedical circuits that don't use much power but still perform well, particularly in things like ECG monitoring. This project looks at designing and checking out a CMOS-based operational transconductance amplifier, or OTA, that is made to handle biomedical signals. ECG signals are weak signals and has low frequency, from about 0.05 Hz to 150 Hz, but the amplifier needs high gain, low power, and good common-mode rejection capacity [1]. After going through some study of this project, we picked a symmetrical OTA setup and built it with bulk-driven technology in CMOS. That bulk-driven helps with low-voltage and

work better with input, which is suitable for portable ECG devices which run on batteries[2]. I implemented and simulated the whole in Cadence Virtuoso using a standard CMOS. It seems suitable for more generic CMOS process. After simulating, we checked parameters like differential gain, common-mode gain, frequency and phase responses, power, and stability with AC analysis. The differential gain came pretty high, and the common-mode one was very low, so the CMRR improved a bit good. I tested it with different supply voltages and bias currents to see if we can use these for biomedical purposes. Power consumption is very low. Sometimes it's hard to get all these right. The results show this OTA can amplify those ECG signals without issues, and it keeps power down. I think it's a great option and more suitable for integrating into small, low-power and wearable ECG monitoring systems.

775.HYBRID CRYPTOGRAPHIC SCHEMES FOR NEXT-GENERATION CLOUD

DATA PROTECTION

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Cloud computing has transformed data storage and access by offering scalability, flexibility, and efficiency, but it also raises critical concerns regarding privacy, integrity, and access control. Traditional encryption ensures confidentiality but limits usability, as encrypted data cannot be processed without decryption. To address this challenge, we propose a hybrid encryption model that integrates Attribute-Based Encryption (ABE) with Homomorphic Encryption (HE). The framework employs a dual-layer architecture: the outer ABE layer enforces fine-grained, attribute-driven access policies, while the inner HE layer enables computations directly on encrypted data without exposing plaintext. This design achieves both policy-based confidentiality and privacy-preserving computation, making it suitable for multi-user cloud environments. Experimental evaluation demonstrates reduced encryption and decryption latency compared to standalone HE, improved throughput over traditional ABE systems, and acceptable computational overhead. Overall, the hybrid ABE-HE scheme provides a balanced solution for secure, efficient, and practical cloud applications in healthcare, IoT, and finance.

**776.SKILLMAP-LLM: PERSONALIZED SKILL ROADMAP GENERATOR WITH
ADAPTIVE
LEARNING & CAREER ALIGNMENT**
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Acquiring new technical skills is often challenging due to scattered learning resources, rigid study plans, and the lack of personalized guidance aligned with individual goals and career outcomes. This paper presents an enhanced Personalized Roadmap Generation System that leverages Large Language Models (LLMs) to generate adaptive, structured, and visually represented learning roadmaps based on a learner's existing knowledge, target skills, and available time. Through checkpoints, carefully chosen resources, and real-time feedback, the system incorporates interactive visualization through an interface based on React Flow. An AI-driven quiz generation module is introduced to improve learning assessment. The module uses LLMs to generate quizzes dynamically and aligns them with roadmap topics. The module ensures ongoing assessment of learner comprehension by offering multi-question navigation, answer tracking, automated scoring, and explanation-based feedback. Additionally, a personalized job recommendation module is incorporated to bridge the gap between learning and employability. The system performs LLM-based skill extraction and keyword generation by combining user resumes, completed roadmap data, and additional skills. In order to provide relevant job opportunities with direct application links, these keywords are used to query job listings through automated web scraping services. The results are then filtered and aggregated. By integrating personalized learning paths, intelligent assessment, and career-oriented job recommendations within a single platform, the proposed system offers an end-to-end solution that supports skill acquisition, self-evaluation, and career readiness. This approach redefines self-paced learning by making it adaptive, measurable, and outcome-driven.

**777.MULTI-MODAL LMS USING AI: VARK STYLE
CLASSIFICATION**

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Personalized digital learning has become essential due to the increasing diversity of learners in online education environments. Conventional Learning Management Systems (LMS) primarily rely on static content delivery mechanisms that fail to accommodate individual cognitive preferences. This paper presents an Artificial Intelligence (AI) driven Multimodal Learning Management System (MLMS) that adapts learning content using the VARK learning model: Visual, Auditory, Reading/Writing, and Kinesthetic. The system identifies learner preferences through questionnaire-based profiling and machine learning classification. Multimodal content is dynamically delivered using an intelligent Content Management System (CMS), while an NLP-based chatbot provides adaptive, VARK-aware assistance. A recommendation engine continuously refines learning paths using behavioral analytics and reinforcement learning principles. Experimental analysis demonstrates improved engagement, adaptability, and learner satisfaction compared to traditional LMS platforms. The proposed system offers a scalable, learner-centric framework for intelligent education delivery. The continuous evolution of digital education technologies has transformed the way learners access and interact with knowledge resources. Despite this advancement, most conventional Learning Management Systems (LMS) still operate using static content delivery models that inadequately address learner diversity. Variations in cognitive preferences, learning behaviors, and engagement patterns often result in inefficient learning experiences, reduced motivation, and inconsistent academic outcomes. These limitations highlight the necessity for intelligent learning platforms capable of delivering adaptive and personalized educational experiences. This paper introduces an Artificial Intelligence (AI)-driven Multimodal Learning Management System (MLMS) that leverages the VARK learning model to provide cognitive-aware personalization. The proposed system integrates learning style detection, multimodal content orchestration, conversational assistance through an NLP-based chatbot, and an adaptive recommendation engine. Learner preferences are identified through a structured VARK assessment combined with machine learning classification techniques. Educational resources are dynamically selected and delivered via an intelligent Content Management System (CMS), ensuring alignment with learner-specific cognitive characteristics. Furthermore, the system incorporates behavioral analytics and feedback-driven adaptation to refine learner profiles and recommendations continuously. Experimental observations indicate significant improvements in learner engagement, content relevance, adaptability, and user satisfaction when compared to traditional LMS platforms. The proposed framework advances intelligent educational systems by combining cognitive learning theory, artificial intelligence, and multimodal instructional strategies.

778.AI-DRIVEN REAL TIME SMART FARMING APPLICATION

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Crop diseases, inefficient water use, climate uncertainty, and a lack of real-time decision support are some of the major issues facing agriculture. IoT sensors are a major component of current smart farming solutions, which raises costs, complicates deployment, and requires more maintenance. An AI-driven real-time smart farming optimization system that doesn't require IoT devices is proposed in this paper. The system provides intelligent crop recommendations, water stress estimation, fertilizer suggestions, yield prediction, and market price analysis by leveraging real-time weather forecasts, historical agricultural datasets, soil test values, crop disease image analysis, and government agricultural portals. When environmental conditions change, a dynamic dashboard automatically updates charts and sends out alerts. A chatbot driven by AI also offers advice on government

programs and farming methods. The suggested system is scalable, affordable, and appropriate for small and medium-sized farmers.

779.NEOPHISH: PHISHING URLS DETECTION USING DATA MINING

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Phishing sites are a big menace to the security of the internet, and the identification of phishing sites effectively is very important as a measure of protection to users. The presented research describes a machine learning-oriented system that detects the phishing websites based on DNS, different aspects of the websites structure and user behavior. The system proposed is based on the combination of classification algorithms, which consist of Gradient Boosting, Extra tree, Rand Forest, Decision Tree, and XGBoost to properly distinguish between a legitimate and a phishing website. This paper aims to test the effectiveness of these algorithms with regards to accuracy and robustness. The findings prove that the system works remarkable as the rates of accuracy with Random Forest and XGBoost are very high. These results demonstrate that the recommended method is quite efficient in detecting phishing websites, and the given method is also very effective when it comes to online protection. The chance of analyzing main characteristics (domain information and the behavior of the site) is an added advantage of the system, which can guarantee its effectiveness in terms of detecting as many different phishing websites as possible. As it is emphasized in this study, machine learning models have the potential to improve the fight against cybercrimes, and it is where future phishing tools can take their future shape.

780.3D OBJECT DETECTION USING LIDAR AND RGB IMAGES

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Point cloud-based learning has increasingly attracted the interest of many in the automotive industry for research in 3D data which can provide rich geometric, shape and scale information. It helps direct environmental understanding and can be considered a base building block in prediction and motion planning. The existing algorithms which work on the 3D data to obtain the resultant output are computationally heavy and time-consuming. In this paper, an improved and optimized implementation of the original Complex-YOLO: Real-time 3D Object Detection on Point Clouds is done using YOLO v4 and a comparison of different rotated box IoU losses for faster and accurate object detection is done. Our improved model is showing promising results on the KITTI benchmark with high accuracy.

781.DESIGN AND DEVELOPMENT OF AN AUTOMATED VALIDATION AND DIAGNOSTIC SYSTEM FOR TELECOM BATTERY MANAGEMENT BOARDS

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Telecom Battery Management Systems (TBMS) are safety-critical systems designed to monitor battery banks in telecom networks. In production scenarios, it is often necessary to validate Telecom Battery Management System boards using in-circuit testing (ICT) and functional testing (FCT) on LabVIEW-based test benches and manual or semi-automatic fixtures. Although these solutions are effective in lab scenarios, they are often challenging to scale and maintain in high-volume production scenarios due to script-based workflows, limited access control, and strong coupling between safety and test logic. The paper introduces a Windows-based industrial test executive architecture that decouples safety enforcement from software-driven test orchestration. The solution is based on an industrial PC (IPC), which can execute multi-protocol communication (CAN, RS485, UART, and BLE), as well as SCPI-based instrument control. A PLC-based pneumatic fixture with reed relay-based signal routing and cell simulation is designed to provide deterministic and repeatable test conditions while ensuring safety-critical activities are isolated from software control. The paper demonstrates that the proposed solution provides scalable and high-performance ICT and FCT capabilities, allowing Telecom Battery Management System production scenarios to exceed 100,000 test cycles without compromising reliability and contact integrity.

782.MORPHDETECTIVE: DETECTING MORPHED FACES IN IMAGES AND VIDEOS USING DEEP LEARNING

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In the present digital world, it is becoming easier to alter both images as well as videos with the help of video editing software like face morphing, wherein the faces of two individuals are smoothly morphed one into the other. Although morphing of images could be used for entertainment or artistic innovation, it has also created more severe problems in terms of biometric security, forensic examinations, as well as identification. This final year project revolves around morphed images as well as videos, wherein detection of morphed images/smoker videos is performed with the help of advanced computer tools like CNN, Autoencoder, as well as GAN, which play an important role in learning features as well as detecting even small morphing of images and videos. For the detection of morphing of images/smoker videos, the project emphasizes the requirement of more data sets as well as the importance of model adaptability. In addition to that, it emphasizes the requirement of more intelligent detection models in order to solve the complexity of the issue. All of the computer tools like Open CV, TensorFlow, as well as Keras, have been implemented for the final year project.

783.LOW POWER MONTGOMERY ARCHITECTURE BASED ON SEGMENTED CLOCK GATING AND PARTIAL OPERAND ACTIVATION

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In the emerging cryptographic world, energy efficient hardware plays a key role especially for applications with limited resources. Cryptosystems such as RSA and ECC use Montgomery multiplication (MM) as a fundamental operation but operating a mobile or IoT device with MM is still a challenge. Clock gating techniques are found to be beneficial but not precise. This research introduces a novel approach by using low-power Montgomery multiplier circuit to resolve the problem. It utilizes both segmented clock gating and partial operand activation as the solution. The primary circuit involves a modified processing element that locates and energizes only the non-zero parts of the operands (Y, M, Z), thus the calculation is the only activity that takes place. Likewise, it has micro-level clock gating that lowers the switching operations in the parts of the computational units that are in idle mode, thereby reducing the amount of dynamic power utilized. The design works with both radix-2 and radix-16 architectures. Also, a standard-cell library has been used for its synthesis. The dynamic power is reduced to as much as 98% in the case without gating when compared to the conventional designs, which proves its efficiency. Moreover, the design can meet timing closure at 100 MHz while maintaining silicon area at a competitive level, thereby proving its effectiveness. This is a huge improvement, presenting a strong and compliant solution for the energy-conscious cryptographic systems of the future.

784.CENTRIFUGAL LAUNCH SYSTEMS- A STUDY

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The Centrifugal Launch Systems is aimed at providing a compact, efficient and cost-effective solution for launching UAVs. Traditional UAV launch methods often require extensive infrastructure or are limited by payload capacity and launch speed. To address such challenges, the proposed system utilizes a rotating mass to store kinetic energy, which is then transferred to a shuttle assembly moving along a rail system, propelling the UAV to the required launch velocity. The design incorporates electric motor driven mechanical impulse system coupled with rail-guided shuttle, ensuring uniform and controlled acceleration of the UAV. Key components include a mass for energy storage, a rail system for linear guidance and a release mechanism for UAV deployment. This system envisages easily configurable UAV launch capability for various weights of the target UAV, different launch velocities and adjustable launch angles. The system's compact design enhances portability, making it suitable for multiple applications, including military, reconnaissance, disaster management and environmental mapping.

785.LI-FI ENABLED VEHICLE SAFETY AND COMMUNICATION SYSTEM FOR REAL- TIME HAZARD MITIGATION

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This project proposes a Li-Fi (Light Fidelity)-based vehicle-to-vehicle communication system aimed at enhancing road safety through intelligent monitoring and real-time alert transmission. The system is implemented using Li-Fi circuits on both the transmitter and receiver sides to allow seamless communication between vehicles. It continuously monitors the driver's condition using alcohol and drowsiness detection sensors. If the driver is found to be intoxicated or falling asleep, the system immediately transmits this critical information to nearby vehicles using Li-Fi signals. On the receiving side, the approaching vehicle is alerted through a buzzer for audio indication and a tri- color LED system to visually indicate the threat level— green for normal operation, yellow for caution, and red for emergency. Furthermore, the system automatically regulates the speed of the vehicle by controlling a DC motor, thereby reducing the chance of collisions caused by impaired driving. The integration of Li-Fi technology ensures high-speed, secure, and interference-free data transmission, making it a reliable choice for vehicle-to-vehicle communication.

786.EARLY WARNING SYSTEM USING LORA FOR LANDSLIDE AND WATER LEVEL DETECTION

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This paper presents a low-cost, energy-efficient Early Warning System (EWS) based on LoRa wireless technology and IoT for landslide and flood monitoring in remote areas with limited connectivity. The system employs a network of multi-sensor nodes (MEMS accelerometers, soil moisture probes, vibration sensors, and ultrasonic water level gauges) that transmit data via long-range, low-power LoRa links to a centralized cloud dashboard. A key innovation is a multi-sensor data fusion algorithm that synthesizes heterogeneous inputs into a unified Landslide Risk Index (LRI), significantly reducing false alarms. Field tests conducted over varied terrain demonstrate reliable LoRa communication up to 3 km with minimal packet loss (PDR $\geq$ 92%), with the system correctly triggering alerts under simulated hazard conditions in under 8 seconds on average. With a unit cost of \$84 per node and solar-powered autonomy, this integrated approach offers a practical and scalable solution for enhancing community resilience in disaster-prone regions lacking conventional communication infrastructure.

787.SELF-LEARNING AUTONOMOUS CYBER DEFENSE AGENTS FOR AI-EMPOWERED SECURITY OPERATIONS

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With cyber threats becoming more complex and frequent, we need smart, adaptable defenses that can keep up with changing attack methods. Traditional intrusion detection systems often rely on static signatures or supervised learning, which fail to generalize to novel attacks and lack the ability to incorporate expert feedback. This paper presents a self-learning cyber defense agent that combines unsupervised anomaly detection using Isolation Forest with a reinforcement learning (RL) module for adaptive response selection, augmented by a human-in-the-loop feedback mechanism. The system continuously monitors network traffic and user behavior, extracting 15 key features from raw logs. Anomaly scores are normalized into risk levels, which feed into a Q-learning agent that decides among three actions: IGNORE, ALERT, or BLOCK. Security administrators provide feedback on alerts, which is used to update the Q-table and periodically retrain the anomaly model, enabling

online adaptation. The framework is implemented as a full-stack application with a Node.js backend, SQLite database, and a React-based dashboard for real-time visualization. Evaluation achieves a detection accuracy of 92.3% on the UNSW-NB15 dataset, alongside a precision of 0.91, a recall of 0.89, and a false positive rate of 5.2%. Simulated attack scenarios (brute force, port scanning, data exfiltration) confirm the system's effectiveness, while feedback-driven learning improves accuracy by 14% over four weeks. The proposed approach offers a flexibility, interpretable, and continuously improving solution for today's world cybersecurity operations.

788.TRAVELVISTA: AN AI ASSISTED SMART TRAVEL PLANNING SYSTEM USING RECOMMENDATION AND ROUTE OPTIMIZATION ALGORITHMS

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TRAVELVISTA: An AI-Assisted Smart Travel Planning System Using Recommendation and Route Optimization Algorithms presents an intelligent web-based tourism platform designed to simplify and personalize travel planning for users while enabling efficient service management for local tourist guides. The system operates through two primary modules: travelers (users) and local guides. Travelers can register and log in to provide detailed tour preferences, such as destination interests, travel dates, budget constraints, and group size. Based on these inputs, the system employs AI-driven recommendation algorithms to generate customized tour plans, offering budget-aware itineraries, destination-specific insights, and festival-based travel analyses to enhance the overall travel experience. The platform integrates data analytics to recommend suitable transportation modes and accommodation options, with seamless redirection to external booking platforms for real-time reservation. A dedicated trip management module provides day-to-day itinerary recommendations, including attractions, travel routes, and optimal time scheduling using route optimization techniques. Additionally, users can explore the profiles of verified local tourist guides, view their expertise and availability, and book guide services through time-slot-based scheduling. By combining recommendation systems, route optimization algorithms, and user-centric design, TRAVELVISTA bridges the gap between travelers and local tourism services, promoting sustainable tourism and offering a scalable and intelligent solution for modern smart travel ecosystems.

789.SECURECHAIN BLOCKCHAIN-DRIVEN PRIVACY SOLUTIONS

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Increasing number of associated devices and sensors lead to continuous generation and storage of large -scale versions of data on centralized cloud platforms, which in turn poses a risk to the user's privacy. Unfortunately, data purposes are often sacrificed in the process of improving privacy. In this study, we present a new approach, a new approach that uses smart contracts and blockchain techniques. The reliable execution environment selected by the user is guaranteed by safe, decentralized data storage and treatment PETchain. Users can ensure privacy compliance by using smart contracts that control service providers how they use their data. As an example of the feasibility and performance of PETchain, you should consider the implementation of a consortium Ethereum blockchain. In this era with ubiquitous computer generation, this new law stops the difference between computer tools and privacy protection.

790.SMART BEAM+: AN ADAPTIVE BEAMFORMING APPROACH FOR URBAN IOT COMMUNICATION

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The rapid growth of the Internet of Things (IoT) application requires a communication system adaptable to user mobility and signal obstruction in urban environments. Conventional wireless systems often fail to maintain reliable connectivity when transmission paths are blocked or receivers move. The project presents Smart Beam+, an adaptive beam management approach that demonstrates the deployment of beams that recognize mobility and obstacles for urban IoT communications. The system detects communication loss to the planned node and redirects the transmission to the available node to maintain connectivity. Functional prototypes use a single patch antenna, a microcontroller-based control unit, and several receiver nodes to demonstrate intelligent beam redirection. The focus is not on quantitative radio frequency performance, but on conceptual validation. The successful prototype confirms the effectiveness of adaptive beam management and its potential significance for future smart city applications.

791.IOT BASED WATER QUALITY DATA COLLECTION AND COMPUTING WQI WITH DEEP LEARNING

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The quality of water poses a serious risk to both public health and environment, and requires efficient and continuous monitoring. For real-time water quality analysis and early contamination detection purpose IoT sensors with deep learning model is used. Traditional water quality testing methods are manual and often don't offer real-time data, limiting the ability to detect contamination timely manner. The aim is to allow contamination to be detected early and ensure water safety through timely warning. The system consists of IoT sensors to continuously collect data of water quality parameters such as TDS, pH, turbidity, EC and temperature from various sources. Sensor data is transmitted using communication protocol like Wi-Fi. A centralized platform Node-red is used to redirect the collected data from sensor to SQL server for processing. Data Pre-processing includes cleaning, handling missing values, normalization. Feature extraction includes statistical and temporal characteristics. Connection between important water parameter is analyzed using statistical correlation method and Deep learning technology. The water quality index is calculated using Artificial Neural Networks (ANN). This model design calculates water quality index using National Sanitization Foundation (NSF) standards. The IoT design uses Low Power Wide Area Network (LPWAN) for providing wide-area coverage to sensors connectivity, due to which real time monitoring, accurate prediction and proactive water quality management is possible. The result shows that the proposed method gives the highest performance with 99.4 percent accuracy and 97.9 percent F1-score which is outstanding compare to all other traditional methods. Future scopes include edge computing technologies for faster, real-time data processing and expanding sensor capabilities to detect chemical contaminants and other pollutants.

792.CAREER RECOMMENDATION SYSTEM WITH SKILL GAP ANALYSIS

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Over the past few years, work on formulating a clear professional path has become an even bigger challenge due to the blistering development of the sectors and the insufficient availability of personal- level career counselling. Current tools largely rely on fixed questionnaires or traditional face-to-face counselling, which often do not support the individual qualities and the dynamism required in the modern workplace. To address this shortcoming, a complex career suggestion backbone founded on machine learning and natural language processing has been developed. Contrary to conventional structures offering generic propositions, the offered model analyses individual data, such as competencies, interests, educational level, and professional experience, and then matches the data with genuine employment opportunities by identifying trends in the current labour market processes. Also, the algorithm conducts a systematic analysis to detect skill gaps and proposes suitable

up-skilling courses that help to maintain a high level of professional growth. The system offers more versatile and relevant career advice as compared to the traditional rule-based or manual approaches by adapting to individual traits and the changing demands of the industry. It has been shown empirically that it improves recommendation accuracy and shortens the decision-making time for users. Integrating advanced data analytics with the latest trends in the field of employment, the system will enable students and professionals to embrace evidence-based career choices instead of speculative guesses. The suggested approach, therefore, provides a flexible and efficient paradigm of personalised career planning in the fast-changing job market.

793.ATTENTION-ENHANCED SEGFORMER WITH TEMPORAL FUSION FOR AUTOMATED MULTI-CLASS WILDFIRE IMPACT AND RECOVERY MAPPING

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Wildfires significantly disrupt forest ecosystems, making accurate post-fire impact assessment and vegetation recovery monitoring essential. Many existing methods rely on single-date imagery or limited temporal modeling, which restricts their ability to capture dynamic recovery patterns. This paper presents an attention-enhanced SegFormer-based framework with temporal fusion for automated multi-class wildfire impact and recovery mapping using multi-temporal Sentinel-2 and Landsat-8 imagery. Satellite data are preprocessed using Google Earth Engine (GEE) for cloud masking, radiometric normalization, and temporal stacking to ensure consistent multi-date analysis. The proposed MSSM- SCDNet integrates a Convolutional Attention Module (CAM) for spectral refinement, a Spatial Attention Module (SAM) for spatial localization, and a Temporal Fusion Block to model wildfire progression across pre-fire, post-fire, and recovery stages. The framework performs pixel-level segmentation into burned, unburned, and recovering classes. Experimental evaluation demonstrates an overall accuracy of 90.26%, confirming the effectiveness of combining transformer-based feature extraction with spatial-spectral attention and temporal modeling. The system is further deployed through an interactive Streamlit interface for visualization and automated reporting, enabling scalable and data-driven wildfire impact monitoring.

794.REAL-TIME OBJECT DETECTION AND LABELLING FROM CAMERA VIDEO USING DEEP LEARNING

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In recent years, object detection has become one of the most critical tasks in the field of computer vision and artificial intelligence. It involves not only identifying objects present in an image but also accurately locating them using bounding boxes or segmentation masks. While traditional methods relied heavily on handcrafted features and classical algorithms such as Haar Cascades and HOG (Histogram of Oriented Gradients), the advent of deep learning and convolutional neural networks (CNNs) has completely revolutionized this domain. With the exponential growth of real-time video data and surveillance requirements, there is an urgent need for automated systems that can detect and classify multiple objects simultaneously with both high accuracy and minimal delay. This research work titled “Real-Time Object Detection and Labeling from Camera Video Using Deep Learning” aims to design and implement a real-time, efficient, and scalable computer vision system capable of detecting and labeling objects such as persons, vehicles, furniture, and natural elements directly from a live camera feed. The proposed system leverages deep learning-based architectures—notably YOLO (You Only Look Once), SSD (Single Shot Multibox Detector), and Faster R-CNN—to achieve fast and precise detection. These models are trained and fine-tuned on large-scale datasets like COCO (Common Objects in Context) and Pascal VOC, enabling recognition across a diverse range of object categories. The implementation framework integrates Python, OpenCV, and TensorFlow/PyTorch, with the live feed captured and processed frame by frame. Each frame undergoes preprocessing (resizing, normalization) before being passed through the selected deep learning model. Detected objects are annotated with bounding boxes and confidence scores, allowing users to visualize the predictions in real time. The system supports both GPU and CPU inference modes, ensuring portability across devices with different computational capabilities. The results demonstrate that YOLOv8 achieves the most favorable trade-off between speed and accuracy, reaching frame rates up to 45–60 FPS while maintaining a mean Average Precision (mAP) above 80%. Compared with classical methods and slower region-based detectors, the proposed approach exhibits superior robustness under varying lighting, motion, and background conditions. This thesis contributes to the ongoing advancement of real-time computer vision applications, including smart surveillance, traffic monitoring, autonomous systems, and industrial automation. It emphasizes practical implementation, reproducibility, and system optimization for both research and commercial deployment. Future work will explore edge computing integration, cloud deployment using Azure/AWS AI services, and the development of custom-trained models for domain-specific detection scenarios. The system’s flexibility and high performance make it a strong candidate for real-world use in various intelligent vision applications

795.SMART WEARABLE OBJECT DETECTION AND DISTANCE ALERT SYSTEM FOR THE VISUALLY IMPAIRED USING RASPBERRY PI

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This thesis presents a smart wearable system designed to assist visually impaired individuals through real-time object detection and distance measurement using a combination of camera and ultrasonic sensors implemented on a Raspberry Pi microcontroller. The device integrates computer vision and deep learning algorithms to

recognize surrounding objects and measure proximity using the HC- SR04 ultrasonic sensor. Detected objects are announced through an audio feedback mechanism, providing users with real-time situational awareness. The system is low-cost, lightweight, and energy-efficient, making it suitable for portable use. Extensive testing demonstrates that the proposed solution offers reliable detection and timely alerts, improving mobility and safety. This project bridges the gap between assistive technologies and modern artificial intelligence, creating a foundation for future enhancements such as GPS guidance and vibration-based feedback

796.SHIELD-INTIMACY: A MULTI-STAGE FORENSIC FRAMEWORK FOR PRIVACY-PRESERVING DETECTION OF NON-CONSENSUAL INTIMATE IMAGERY

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The swift development of deep fake technology and the misuse of personal content have led to the detection of Non-Consensual Intimate Imagery (NCII) becoming a key requirement in the domain of digital safety. Currently, the moderation techniques used to address this problem are often accompanied by high rates of false positives and privacy risks due to the storage of sensitive information. This paper introduces a new privacy-preserving forensic tool called Shield-Intimacy, which is aimed at providing a solution to the problem of NCII detection through a four-stage pipeline. This tool combines a triage mechanism for NSFW content, a feature extraction mechanism using 512-dimensional vectors, and a forensic scoring mechanism to identify synthetic content. This is achieved through the storage of identity information in serialized forms, which ensures high-speed retrieval while ensuring the privacy of the information. Experimental findings show that the multi-layered mechanism is more effective in terms of accuracy in distinguishing between legitimate and malicious content.

797.“TOXIC SHIELD AI” - A REAL TIME TOXIC COMMENT DETECTION AND REWRITING PLATFORM USING AI & ML

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The rapid expansion of social media has greatly increased users' exposure to toxic content, including hate speech, insults, and offensive language, posing major challenges for effective moderation. Relying solely on manual moderation is often inefficient, inconsistent, and unable to keep up with the overwhelming volume of

user-generated content. To tackle these challenges, we introduce ToxicShield AI, a real-time system designed to identify and reduce toxic comments using advanced language understanding and machine learning techniques. Unlike existing solutions, ToxicShield AI features a custom-built multilingual detection model that provides wider language coverage and promotes greater fairness across diverse communities. The platform integrates with a browser extension that automatically identifies, classifies, and manages harmful comments. Socially toxic content is either rephrased into neutral language to preserve communicative value or blurred and flagged for moderator review in cases of extreme toxicity. A moderator panel provides oversight, allowing human reviewers to validate decisions and provide feedback, thereby enhancing model performance over time. Moving forward, ToxicShield AI aims to extend scalability across platforms and improve context sensitivity, promoting a safer, more inclusive online environment while upholding freedom of expression.

798. INTELLIGENT FIREWALL ANOMALY DETECTION WITH SEMANTIC ANALYSIS AND HYBRID LEARNING

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The presence of the sophisticated intrusions and the zero-day attacks has rendered old firewalls ineffective in detecting the attacks, as cyber threats are developing rapidly. To conduct a more effective detection of anomalies in network traffic, this paper suggests a smart firewall system, which is a combination of semantic analysis and hybrid learning models. The Natural Language Processing (NLP) feature of the system allows it to process network logs and identify language patterns, as well as give context to suspicious activity. This, as compared to rule-based or signature-based methods, can help the system to identify the difference between benign problems and real threats. The proposed algorithm involves the application of a hybrid machine learning technique that involves the variational autoencoders (VAEs) with convolutional neural networks (CNNs) to detect anomalies. Whereas VAEs are applied to learn the background distribution of normal network behavior and identify changes that are indicative of anomalies, CNNs apply to infer geographic properties of the traffic patterns. Ensemble learning techniques such as Random Forests and XGBoost are also used to make the algorithm more precise and robust. After being developed in Python and written and executed in Visual Studio Code, the model was trained with the help of benchmark intrusion detection datasets, such as NSL-KDD and CICIDS2017. In comparison with conventional firewalls, experimental findings reveal that there is high detection accuracy and a great reduction of false positives. Besides enhancing the rate of detection of creative attacks, this ingenious technology provides scalability and flexibility of real time network environment. The proposed approach is one of the biggest steps towards the development of proactive, adaptive, and semantically aware next- generation firewall systems.

**799.HIGHLY EFFICIENT THREE OPERAND ADDER
LEVERAGING WEINBERGER PREFIX ARCHITECTURE
FOR SECURITY SYSTEMS**

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Weinberger adder is an intricate and vital component in the contemporary computing to support the high-performance data processing requirements of the digital systems. Because binary addition is one of the fundamental operations in such systems, recursion algorithms and structures must be studied, with the system-level factors of power consumption, wiring trade-offs and circuit design methodologies being of interest. This work aims at the development and evaluation of a power efficient VLSI adder that maximizes processing speed at minimum power consumption following the Weinberger design. The Weinberger adder is enhanced by a two-bit selective addition block that is built into the parallel architecture to enhance computation speeds and carry propagation. This work introduces a novel computational algorithm of addition using the Weinberger recursion and implemented and tested in Vivado design environment. The Weinberger architecture is a good option of the present-day VLSI designs that offer flexibility that enables CMOS implementations. The results reveal the flexibility of Weinberger adders which are best suited in imaging systems, multimedia real-time processing as well as cryptographic security applications based on AI activities.

800.SAFEASSIST+ : AN INTEGRATED ASSISTIVE PLATFORM FOR PHYSICALLY ABLED AND VISUALLY CHALLENGED

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People with physical and visual impairments commonly face problems while performing everyday tasks such as navigating outdoors, receiving human assistance in real time, and reading textual information from various documents or signboards. Although many assistive solutions are developed, most of them lack integrated human support, failing to ensure situational accessibility. This work proposes SafeAssist+, a mobile AI-enabled application that was designed considering significant advantage of human volunteer support. The system connects users in need of assistance with nearby volunteers who can provide skill-based support, like navigation guidance or reading assistance. The backbone of SafeAssist+ lays down a sophisticated implementation of AI through OCR-based text reading and guiding chatbot to reinforce the overall accessibility of the proposed system. Experimental evaluation and survey-based analysis show that the proposed system enhances usability, increases trust, and aids in real-world effectiveness by prioritizing human-assisted support complemented by artificial intelligence.

801.AN AI-DRIVEN MULTI-AGENT FRAMEWORK FOR AUTOMATED REVENUE LEAKAGE DETECTION AND RESOLUTION

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Enterprise financial systems incur substantial, often undetected revenue losses due to fragmented monitoring, delayed audits, and opaque anomaly detection. While existing methods identify irregular transactions, they rarely integrate root cause analysis or operational remediation into a unified workflow. We propose a multi-agent AI framework that detects revenue leakage directly from spreadsheet-based transactions, delivers explainable diagnoses, and orchestrates automated ticketing. The framework comprises seven stages: data

ingestion and preprocessing, embedding and vector storage, agentic anomaly detection, LLM-based root cause analysis, CrewAI-driven departmental routing, hybrid AI-manual resolution, and a retrieval-augmented dashboard for interactive analytics. Experiments on enterprise-style datasets demonstrate superior anomaly detection precision, accelerated investigations, and robust automated ticket generation, establishing scalable, interpretable, end-to-end financial governance.

802. SMART TROLLEY WITH AUTOMATIC BILLING SYSTEM

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Families spend the majority of their shopping time at Malls, Shopping Complexes and Retail Stores. Most shops ask that customers carry their own shopping trolley and collect their items in it and then take the shopping trolley to the checkout area, where they have to wait in long lines before being invoiced for their items. The system we are proposing is to use a «smart» trolley and the latest technology, «automated billing» using RFID and IoT Technology. With this new system, each product will be equipped with an RFID tag, the trolley will have an RFID reader and detect all the items placed into or removed from the trolley. The trolley will update its list of items as well as the total amount charged in real time and it will synchronize this information to an application on the user's mobile device. This new system will enable a shopper to pay digitally without having to go through a cashier. By automating the process of billing and inventory tracking, this new system reduces the amount of physical labour that is required from both the consumer and store employee. The new smart trolley provides a smart, efficient, cost effective way for Retailers to enhance their Retail Automation process.

**803.A COMPREHENSIVE REVIEW ON DIRECT SHEAR TEST
STUDIES: INFLUENCE OF STANDARD TAMPING LOAD,
COMPACTION, AND LAYERING METHOD ON SOIL SHEAR
STRENGTH.**

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The direct shear test is a important method for determining soil shear strength parameters such as cohesion and internal friction angle. This review summarizes recent studies that investigate how variations in standard tamping load, compaction, and layering method affect direct shear test results. Research shows that specimen geometry, loading direction, and comp action level significantly influence measured shear strength, while studies on peat and modified soils reveal that compaction slightly increases friction but has minimal effect on cohesion. The review highlights the importance of proper sample preparation and testing conditions to achieve reliable and representative soil behavior in laboratory testing.

**804.SMART OUTFIT RECOMMENDATION SYSTEM BASED ON
COLOR THEORY USING DEEP LEARNING TECHNIQUES**

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Color greatly affects outfit selection and impacts on visual perception and personal confidence. Even though there are theories of color harmony, still people have difficulty in selecting the right outfit for their skin tone and occasion. To the best of our knowledge, limited existing works integrate color theory with deep learning for personalized outfit recommendation, which motivates this work to tackle the problem. The proposed system is a web application based on which personal information such as gender, age and skin shade is gathered from user. It recommends color options for the chosen skin tone. Users then choose their favorite colors and add contextual information such as event, weather, etc. These inputs are analyzed by two deep learning models, which predict more appropriate outfit types and color combos. Different from traditional fashion recommendation systems, which usually base on emerging trends, our system highlights the visual harmony and real-life context. Proposed method, users are helped to select better appropriate clothing combinations products to wear daily or for office, party and festival. The experimental results imply that combining color theory and deep learning could enhance personalization in overall outfit recommendation experience.

805.DETECTION AND ANALYSIS OF VIOLENCE IN VIDEO FOOTAGE USING A 3D CONVOLUTIONAL NEURAL NETWORK

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Security and safety in the public sector can be enhanced through automated violence detection enabled by video surveillance. A 3D convolutional neural network can automatically detect violent scenes in video clips (3D CNN). In real-time conditions, it is impractical, time-consuming, and error-prone to monitor large-scale video manually. Parental controls, content moderation systems, and surveillance applications have yet to detect violence in multimedia content. The factorized (2 +1)D CNN with residual 3D convolutions is suggested in the proposed approach, and the factorization of spatial and temporal convolutions allows a significant reduction in training time without compromising performance. It has its own frame generator that retrieves and processes video frames, preserving the temporal connection that can be significant in violence recognition. The model architecture is also trained with residual connections and progressive downsampling in order to learn hierarchical spatio-temporal features. The model that we trained on a list of violent and non-violent video clips (70/15/15 train/validation/test split) has a test set accuracy of 85.7%. Precision-recall analysis indicates that it is slightly higher in finding non-violent content (0.87 precision, 0.89 recall) than it is in finding violent content (0.83 precision, 0.81 recall). The confusion matrix analysis gives more information about classification performance. This system shows that deep learning models are effective for automatically detecting violence. It prepares foundations for more sophisticated systems of content moderation that establish safer environments on the Internet.

806.PLANT DISEASE PREDICTION METHODS: FROM TRADITIONAL TO MODERN APPROACHES

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Plant diseases are one of the primary reasons for decreased agricultural output globally, necessitating precise and prompt forecast approaches. Over time, plant disease identification has progressed from manual visual inspection to automated systems driven by machine learning and artificial intelligence techniques. Early approaches depended on manual observation and basic image processing, which were constrained by subjectivity and contextual factors. Machine learning boosted accuracy by utilising classifiers like Support Vector Machines and Random Forests, but these methods still relied on handmade features. In particular, deep learning models such as Convolutional Neural Networks (CNNs) have demonstrated improved performance by directly learning discriminative features from raw leaf images. Furthermore, IoT-based and sensor-driven systems increasingly incorporate environmental data such as temperature, humidity, and soil conditions into disease predictions. Current research trends increasingly emphasize ensemble learning, computationally efficient architectures for mobile platforms, and explainable AI techniques to enhance reliability in practical agricultural environments. This study focusses on the evolution of plant disease prediction systems, their strengths and limits, and future perspectives for sustainable and intelligent agriculture.

807.DEFENDERPI - AN AI-DRIVEN INLINE NETWORK DEFENSE SYSTEM FOR SMALL AND EDGE NETWORKS USING RASPBERRY PI

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Small-scale networks such as homes, laboratories, and small offices face increasing cyber threats yet lack affordable, proactive defense infrastructure. This work presents DefenderPi, a Raspberry Pi-based inline network security appliance that combines intrusion prevention, behavioral analytics, DNS security, and controlled enforcement within a unified edge architecture. Operating as a wireless access point and gateway, DefenderPi inspects all inbound, outbound, and lateral traffic. Suricata is deployed in NFQUEUE inline IPS mode with 21k optimized rules to perform deep packet inspection of new flows, enabling real-time detection and automated blocking of high-severity threats. A strike-based escalation engine enforces temporary and permanent quarantines using ipset, while active sessions are terminated via conntrack to ensure immediate containment. Beyond signature detection, DefenderPi integrates Pi-hole with Unbound for DNS-layer filtering and employs lightweight unsupervised models—Isolation Forest and KMeans—to detect anomalous and drifting per-device behavior. A centralized policy engine correlates multi-layer signals using confidence fusion and temporal reasoning to support explainable, adaptive enforcement. Real-time alerts, administrative control, and threat-intelligence enrichment are provided through a secure Telegram interface, while Redis-backed state tracking and Grafana dashboards ensure full observability. Experimental evaluation demonstrates stable inline intrusion prevention and behavioral correlation within Raspberry Pi-class hardware constraints, establishing DefenderPi as a practical, edge-optimized security platform for small networks.

808.ENHANCING AMD DIAGNOSIS WITH TRANSFER LEARNING TECHNIQUES ON FUNDUS IMAGES

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Age-related macular degeneration remains one of the leading causes of vision impairment among elderly populations. Early and accurate diagnosis is necessary for effective treatment and management of the disease. While deep learning has achieved remarkable success in medical image analysis, de novo model training involves large-scale datasets and significant computation. This paper presents an automated AMD detection framework based on transfer learning with EfficientNet-B0, considering these challenges. The proposed system utilizes the pretrained EfficientNet-B0 model for finetuning on retinal fundus images to extract features related to AMD, which includes drusen and macular abnormalities. Resizing, normalizing, and enhancing image contrast improves image quality while data augmentation techniques of rotation, flipping, and zooming increase dataset diversity to mitigate overfitting. The resultant features are then classified via dense layers to determine the presence of AMD. Accuracy, precision, recall, and F1-score are used to measure the performance of the model

and assure that detection is reliable and efficient. Compared to much more complex models, such as Vision Transformers and hybrid cascaded models, the proposed work offers a far simpler, quicker, and much more computationally efficient solution, therefore making it highly suitable for real-time clinical applications. The potential of this framework to support early AMD diagnosis in various healthcare settings, even in resource-constrained and rural areas, may lead to improved patient outcomes and better quality of life.

809.AI ENABLED REMOTE CONTROLLED FIRE FIGHTING ROCKER BOGIE WITH FIRE TYPE DETECTION

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This paper presents an AI-enabled remote-controlled fire fighting robotic platform based on a rocker-bogie suspension system designed to navigate uneven terrains in hazardous environments. The robot integrates real-time fire detection using computer vision and sensor fusion, enabling classification of fire types (e.g., electrical, chemical, ordinary) for improved situational awareness. A remote control interface provides human oversight, while onboard AI modules process visual and thermal data to detect and categorize fire accurately. The rocker-bogie mechanism enhances mobility over obstacles, improving deployment in cluttered or collapsed environments compared with conventional wheeled robots. Experimental results demonstrate the system's performance in detecting and classifying different fire sources, navigating obstacles, and controlling extinguishing mechanisms remotely. This integrated solution aims to reduce risk to human firefighters by providing early detection, intelligent classification, and efficient remote manipulation to support firefighting efforts in both indoor and outdoor scenarios.

810.AI- POWERED SECURE FINANCIAL PORTFOLIO & TRANSACTION PROTECTION PLATFORM WITH BEHAVIORAL BIOMETRICS AND PREDICTIVE FRAUD INTELLIGENCE

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As digital financial ecosystems transition toward decentralized and high-frequency environments, traditional static authentication methods—such as passwords and multi- factor authentication (MFA)—have become increasingly vulnerable to sophisticated social engineering, deepfake injections, and automated account takeover (ATO) attacks. This paper proposes a novel AI-Powered Secure Financial Portfolio & Transaction Protection Platform that leverages a synergistic combination of Continuous Behavioral Biometrics and Predictive Fraud Intelligence. Unlike conventional "point-of- entry" security, our system implements a non-intrusive, multi-modal biometric engine that analyzes keystroke dynamics, touch-screen pressure, and navigational patterns to construct a unique "Digital DNA" for each user. This is coupled with a Hybrid Long Short-Term Memory (LSTM) and Gradient Boosting architecture that identifies micro-deviations in transactional behavior to predict fraudulent intent before execution. Experimental results on a high-fidelity synthetic financial dataset demonstrate that the proposed platform achieves an Equal Error Rate (EER) of 0.42% and a Fraud Detection Rate (FDR) of 99.6%, significantly outperforming state-of-the-art reactive models. Furthermore, we address 2026 privacy mandates by utilizing Differential Privacy to ensure that sensitive biometric templates remain mathematically encrypted and inaccessible to third parties. Our findings suggest that the integration of behavioral intelligence and predictive modeling provides a robust, frictionless defense mechanism essential for the future of secure global finance.

811.BONE AGE ASSESSMENT FROM HAND X-RAYS USING DEEP CNNs AND ATTENTION MECHANISMS

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The estimation of bone age is important in determining pediatric growth and developmental problems from growth disorders and as a result of abnormal hormonal levels. The standard methods for estimating bone ages rely on hand X- ray images that are visually compared against X-ray reference images (e.g., Greulich–Pyle and Tanner–Whitehouse). These standard methods of estimating bone ages have problems that result in inconsistent and inaccurate data due to the time needed for a physician to visually compare each X-ray image. To improve the estimation of bone age from hand X-rays through automated methods using machine learning, we developed a framework for estimating bone age from hand X-rays using convolutional neural networks (CNNs) and attention mechanisms. This framework allows CNNs to automatically extract a detailed hierarchy of features from hand X-rays and apply attention modules that focus on clinically relevant areas (e.g., carpals, metacarpals, and phalanges). The final output of this framework is a numerical value corresponding to the estimated bone age and visual representations generated by Grad-CAM heatmaps. Experimental results based on publicly available pediatric hand X-ray datasets indicate that our proposed framework will provide clinicians with improvements in the accuracy, reliability, and speed of their current methods for estimating bone ages, therefore positively impacting the diagnostic process of pediatric patients.

812.AN IMBALANCE-AWARE DUAL-BRANCH TRANSFORMER ARCHITECTURE FOR IOT INTRUSION DETECTION

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With the rapid growth in the Internet of Things (IoT), the environment has become increasingly vulnerable to attacks against it. This makes the IoT an attractive target for cybercriminals. The potential viability of an Intrusion Detection System (IDS) using deep learning techniques as a detection mechanism is strong; however, the data used to train and develop these IDS systems, when applied to the IoT in the real world, often suffer from extreme class distribution imbalances. We propose a solution to this problem by introducing the Imbalance-Aware Dual-Branch Transformer IDS (IDBT-IDS), which will enable more accurate detection of intrusions and will also increase the accuracy of detecting rare attacks. The IDBT-IDS is made up of three components: a shared CNN for feature extraction; a binary-Transformer branch to classify traffic as either benign or attack; and a multi-class Transformer branch to provide more granular classifications of attacks. The two branches of the IDBT-IDS make decisions that are combined through an attention-based fusion mechanism. The use of a balanced focal loss function helps mitigate the negative impact of class imbalances. Experiments conducted using a large IoT data set comprising of a large variety of interconnected devices, concluded that the overall accuracy of the system was around 79%, showing notable improvements related to the ability to recall (approximately 25 percent improvement) on rare attacks as well as on the overall macro-F1 score (as measured at 0.51%) when compared to IDS that base their machine learning on a Transformer architecture. These findings provide evidence supporting the assertion that implementing a hierarchical approach and using an imbalanced data-aware learning algorithm can increase the reliability of IDS used to protect IoT devices in the real world.

813.A LIGHTWEIGHT DOMAIN-ADAPTIVE FRAMEWORK FOR IMAGE-BASED MALWARE CLASSIFICATION

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Malware obfuscation and code reuse techniques have led to dramatic changes in the distribution of legacy and modern malware datasets. Conventional CNN-based classifiers trained on static datasets, such as Malimg, are unable to generalize to dynamic threats. This paper proposes DANN-MobileNetV2, a domain- adaptive framework for cross-dataset malware classification with realistic distribution shifts. The proposed framework combines a MobileNetV2 feature extractor with a Gradient Reversal Layer (GRL)-based adversarial alignment module and a ResNet-enhanced class-conditional DCGAN (ReDCGAN) to address the class imbalance problem. Crucially, The learning strategy operates without labeled target data. Experimental evaluations on Malimg (source) and WALT30 (target) datasets show the superiority of the proposed framework, achieving 97.1% and 96.6% accuracy, respectively. With a highly optimized parameter size of 3.4M, the proposed DANN-

MobileNetV2 is highly efficient for real-world deployment in resource-constrained edge systems, outperforming the state-of-the-art GAN-augmented baselines in terms of precision and computational complexity.

814. ANALYSIS OF SMART SOLAR-POWERED INDUCTION STOVE WITH FULL BRIDGE INVERTER CIRCUIT

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This paper presents the modeling and simulation analysis of a smart solar-powered induction stove using a full-bridge resonant inverter topology. This proposed system integrates a photovoltaic (PV) array, a Maximum Power Point Tracking (MPPT)- based DC–DC converter, battery energy storage, and a high-frequency full-bridge inverter feeding a series resonant induction load. The PV system generates a regulated DC output of approximately 12.93 V under standard test conditions, which is used as the DC link input for the inverter stage. The full-bridge inverter converts the DC input into high- frequency AC excitation, which energizes the induction coil through a series RLC resonant tank. Resonant operation near the calculated frequency of 73 kHz ensures efficient energy transfer and reduced switching stress. MATLAB/Simulink simulation results validate the resonant behavior, stable sinusoidal coil current, and effective high- frequency operation of the proposed system. The study demonstrates the feasibility of integrating solar photovoltaic energy with induction heating technology for sustainable and off-grid cooking applications.

815.ADAPTIVE CREDIT CARD FRAUD DETECTION USING DEEP LEARNING AND REINFORCEMENT LEARNING

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Credit card fraud detection is a critical and challenging task due to highly imbalanced data, sequential transaction behavior, and the high financial cost of misclassification. This work presents a hybrid deep learning and reinforcement learning framework for cost-sensitive credit card fraud detection. Transaction data are converted into user-level temporal sequences and modeled using a Long Short-Term Memory (LSTM) network to capture sequential patterns and generate latent embeddings along with fraud probability scores. These learned

representations are then used as state inputs to a reinforcement learning environment, where a Proximal Policy Optimization (PPO) agent is trained to make adaptive decisions by choosing to approve, block, or manually review transactions based on a cost-aware reward function. Experimental evaluation shows that the proposed DL+RL approach reduces overall financial loss compared to a deep learning only baseline, demonstrating the effectiveness of combining sequential modeling with reinforcement learning for real-world credit card fraud detection systems.

816.INTELLIGENT PATTERN RECOGNITION USING EQUILIBRIUM OPTIMIZER FOR ANDROID MALWARE DETECTION: A HYBRID DEEP LEARNING APPROACH

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The ubiquitous nature of the Android operating system has made it a primary target for cybercriminals, leading to an exponential increase in sophisticated malware. Traditional defense mechanisms, primarily signature-based detection, struggle to keep pace with polymorphic threats and obfuscation techniques utilized by modern attackers. Consequently, there is an urgent need for intelligent, adaptive, and resource-efficient detection frameworks. This paper proposes a novel hybrid malware detection system that integrates the Equilibrium Optimizer (EO), a physics-based metaheuristic algorithm, with advanced Deep Learning (DL) architectures. The proposed framework implements a rigorous two-stage feature engineering pipeline. Initially, a Random Forest (RF) classifier ranks high-dimensional static features based on Gini impurity, effectively filtering noise. Subsequently, the Equilibrium Optimizer operates as a wrapper method to identify the globally optimal feature subset, balancing the conflicting objectives of maximizing classification accuracy and minimizing feature vector size. These optimized features are then transformed and processed by a Convolutional Neural Network (CNN) adapted for 1D feature sequences. Extensive experiments were conducted on a balanced dataset of benign and malicious applications. The results demonstrate that the EO-optimized CNN achieves superior performance, attaining an accuracy of 97.5%, an Area Under the Curve (AUC) of 0.9907, and exceptional precision and recall rates. Notably, the feature optimization process reduced the input dimension from hundreds to a concise subset of key indicators, significantly lowering the computational overhead. This efficiency makes the proposed

solution highly viable for deployment in resource-constrained mobile environments where battery life and processing power are critical constraints.

817.DECENTRALIZED LOG PROTECTION AND INTRUSION DETECTION USING BLOCKCHAIN-INSPIRED STORAGE: A COMPREHENSIVE ARCHITECTURE FOR CLOUD FORENSICS

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In the contemporary era of cloud computing and distributed systems, system logs constitute the primary source of truth for forensic analysis, security auditing, and operational troubleshooting. However, traditional centralized log storage architectures remain inherently vulnerable to tampering, unauthorized modification, and deletion. Sophisticated attackers, upon gaining privileged access (root/admin), often prioritize scrubbing these logs to eliminate evidence of their activities, thereby rendering post-incident forensics ineffective and violating compliance standards such as GDPR and PCI-DSS. This paper introduces a comprehensive Decentralized Log Protection and Intrusion Detection System designed to secure AWS server infrastructure logs against such advanced persistent threats. Our solution integrates a real-time monitoring engine that detects six specific intrusion patterns—including SQL Injection, Brute Force, and DDoS—and immediately encapsulates these critical events into immutable blocks using SHA-256 cryptographic hashing. Deviating from computationally expensive public blockchains like Ethereum, we utilize a MongoDB Replica Set with a custom "Blockchain-Inspired" application layer to maintain a synchronized, tamper-resistant private ledger that balances high-throughput performance with cryptographic security. The system features a dual-interface architecture: a Tkinter-based simulation environment for generating realistic, high-volume server traffic and a Streamlit web dashboard for transparent auditing. By combining rule-based detection with a blockchain-inspired storage mechanism, this tool ensures that once an intrusion is detected, the forensic evidence is cryptographically sealed, permanently verifiable, and resilient against single-point failures.

818.GEOSYNTHETIC-REINFORCED SOIL TO ENHANCE FOUNDATION STABILITY

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In developing countries, the demand for affordable housing is rising rapidly. However, the availability of stable land for construction is often limited, and weak soil conditions pose a major challenge. Strength of Geosynthetic materials play role to enhance stability of shallow foundation. In the field of road construction use of geosynthetic reinforced soil increase the strength stability of pavement. When Geosynthetic materials use in the pavement it reduces the thickness of sub grade. Geosynthetic including mainly Geotextile, Geogrids, and Geocell offer an innovative and cost- effective solution to enhance the performance of shallow foundations. When placed beneath or within the soil, these materials improve load distribution, reduce settlements, and increase bearing capacity. This approach is especially useful to enhance the foundation stability, enabling construction even on marginal soils without expensive soil replacement or deep foundation systems.

819.EMBEDDED IMPLEMENTATION OF A DIGITAL TWIN BASED BLDC PROPULSION SYSTEM FOR UAVS

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The Unmanned Aerial Vehicles (UAVs) are highly burdened with the energy consumption of propulsion, whereby Brushless DC (BLDC) motors contribute the largest proportion of onboard-powered requirements. Although works have already suggested predictive and model-based approaches towards propulsion planning, little work has shown how these approaches can be implemented on embedded hardware to use real motor feedback. The paper states a Digital Twin-based BLDC propulsion system with its implementation and experimental validation on an STM32 microcontroller to optimize the energy of the UAV. A digital twin of 1000 KV BLDC motor is a real-time digital model that is based on the voltage, current, PWM, and RPM measurements that have been obtained at a hardware test bench. The embedded twin drive is used in conjunction with the real motor to predict the propulsion behavior and enable proactive throttle control. The entire set consisting of the sensor purchase, execution of the digital twin, and motor control based on the PWM is implemented on a platform based on STM32 NUCLEO and tested on experimental data. Findings of measurements made at hardware level confirm that there is a high level of correlation between the predicted and actual motor behavior, which confirms the practical viability of implementing digital twin-assisted propulsion intelligence within resource- constrained embedded systems. The applied framework provides a feasible base of predictive energy optimization of UAV propulsion systems.)

820.SYMAI – SMART SYMPTOM EVALUATION TOOL

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Recent progress in natural language processing has made it possible to build interactive systems that can answer user queries in a meaningful way. In this project, a smart symptom evaluation tool called SymAi is developed using a pre-trained BERT-based question answering model. The system takes user questions related to medical symptoms and retrieves relevant information from a predefined medical knowledge context, ensuring that responses remain focused and controlled. To improve reliability, a confidence threshold mechanism is included so that uncertain answers can be filtered out, reducing the risk of misleading outputs. The model is implemented using the Hugging Face Transformers library and integrated with a Gradio interface to allow real-time interaction. It is important to note that the tool is intended to assist users with general information and not to replace professional medical diagnosis. Initial testing shows that the system can provide quick and understandable responses to symptom-related queries, demonstrating how transformer-based models can support lightweight healthcare assistance applications.

821.AUTOENCODER-BASED KEY GENERATION FOR SECURE IMAGE ENCRYPTION WITH CHAOTIC DIFFUSION AND AES

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Secure image transmission over open networks is essential for modern multimedia applications. This paper presents a learning-assisted and chaos-driven image encryption framework that integrates deep learning-based key generation, chaotic permutation and cryptographic diffusion. A 512-bit image-dependent session key is generated from the input image using an entropy-regularized autoencoder and divided into two independent 256-bit sub-keys. The first sub-key is employed for AES-256 encryption, while the second drives a chained diffusion process to enhance security. Experimental results demonstrate a key space of , near-uniform histograms, information entropy values close to 8, correlation coefficients near zero, NPCR above 99.60% and UACI around 33%. These findings confirm strong resistance against statistical and differential attacks, indicating the robustness and effectiveness of the proposed scheme.

822.REAL-TIME GESTURE-BASED CONTROL OF ELECTRONIC DEVICES USING CNN AND COMPUTER VISION

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This work presents a touchless, real-time system for controlling home appliances via the recognition of static hand gestures using computer vision and deep learning. The system uses a convolutional neural network (CNN) that has been trained using public data containing static hand gestures, to classify six different gestures using a different control command for each gesture within the raspberry pi controller device. The classified gesture was passed by the raspberry pi controller device to control any appliance connected, e.g. lights, fans, etc. the processing pipeline was run locally on the user's computer, in order to address concerns over data privacy and latency, and to avoid complications caused by cloud-based architectures. The researchers designed the system with affordability, simple operation, and hygiene in mind. This system can be a substitute for traditional switches in any application, including but not limited to home automation, disability assistance, and healthcare application settings. The presenter identify the implications of this work, while demonstrating the feasibility of using artificial intelligence in conjunction with an embedded system to provide a privacy-preserving AI solution in the home automation space

823.DISASTER RECOVERY COMMUNICATION PLANNING IN REAL TIME MANET APPLICATION USING A SINGLE ESP32 OFFLINE MESH RELAY

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Natural disasters such as floods, wildfires, earthquakes, and landslides severely affect human life and damage critical infrastructure. Effective disaster response requires communication systems that continue to operate even when conventional networks fail. Traditional methods depend on manual processes or complex detection techniques that often struggle to provide timely and reliable communication during large-scale emergencies. This paper presents a hybrid long-range emergency communication system based on ESP32 and LoRa technology, designed specifically for disaster-prone regions where cellular networks become unavailable. In the proposed system, the ESP32 acts as a temporary Wi-Fi access point, enabling nearby smartphones to send SOS alerts, location data, and sensor information without any SIM card or existing network. The collected data is then transmitted over long distances through a LoRa transceiver, ensuring communication coverage up to several kilometers. The system supports mesh-based scalability, low power consumption, and battery or solar operation, making it suitable for field deployment during infrastructure failure. Experimental evaluations demonstrate stable data transmission, wide coverage, and minimal packet loss under disrupted conditions. The overall approach provides a dependable, mobile-friendly, and cost-effective communication platform that enhances early disaster response, coordination, and situational awareness.

824.ZENTHRA AI: AN ACTIVE PERCEPTION-BASED AUTONOMOUS AGENT FOR MOBILE TASK AUTOMATION

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ZENTHRA AI is a smart autonomous helpful which is not limited by the limitations of the classic chatbots, which are usually limited to responding only to the textual inquiries by the user. Rather than assuming that all textual input represents a question, sophisticated heuristic analysis is used to determine if what has been inputted represents a genuine query, that needs to be acted upon, to produce the appropriate natural language response or start task-specific actions such as the creation and persistence of reminders. Fundamentally, ZENTHRA AI works based on the Look - Think - Act - Validate methodology: users first look over the input with the help of a large language model to determine their intents and then a decision-making module will classify the input as a question, a task, or an ambiguous statement which needs further clarification. ZENTHRA AI provides such a safe environment for automated execution of tasks according to the user's intention that its applicability is not limited to the standard chatbot and also goes into educational and private productivity areas.

825.AI-BASED DELETED DATA RECOVERY FROM STORAGE

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The recovery of fragmented and partially overwritten digital files is a long-standing challenge in digital forensics. Traditional file carving, relying on fixed byte signatures, fails when key metadata is lost. This paper presents an AI-driven pipeline that integrates a Swin Transformer V2-based fragment classifier (CarveFormer), Supportive Clustering with Contrastive Learning (SCCL), graph-based fragment reordering, and diffusion-style generative reconstruction. The system is designed to tackle challenging forensic scenarios on datasets like FFT-

75. Evaluations demonstrate that the proposed system achieves substantially higher full-file recovery rates (up to ~80%) than traditional signature-based carving tools (typically ~50%) under heavy fragmentation and metadata loss. Furthermore, the diffusion module significantly improves the quality of partially recovered files, achieving an average Structural Similarity Index Measure (SSIM) of ~0.90 for images with missing blocks.

826.DEEP LEARNING BASED IMAGE INPAINTING AND RESTORATION SYSTEM USING PARTIAL CONVOLUTIONAL NETWORKS AND AUTOENCODERS

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Image inpainting and restoration methods are crucial techniques in a range of fields, from the preservation of cultural artifacts to medical image enhancement and helping with forensic analyses. The earlier solutions-often interpolation-based or exemplar-based filling-tend to be performed poorly when faced with an irregular, larger, or structurally complicated missing region. Many recently developed deep learning models tend to carry similar disadvantages with them, often producing a blurred texture, failing semantic alignment, or requiring intense computational resources. To overcome these shortcomings, an integrated framework involving Partial Convolutional Networks, Autoencoders, and U-Net architecture is proposed by the paper. Robust structural restoration is ensured by Partial Convolutions, while coherence in the overall image is enhanced by the Autoencoder by refining the global features, and fine- detail restoration is reinforced by U-Net through its typical skip connections. A mixed set of L1, perceptual, and style- based loss functions is used to train the unified system to achieve an ideal balance between accuracy, visual realism, and textural fidelity. This model helps to effectively handle irregular missing regions, high-frequency details to be preserved, and post-processing artifacts to be minimized, providing a flexible and scalable solution for high-quality image restoration.

827.GOVERNMENT SCHEMES RECOMMENDATION API WITH MULTI-LANGUAGE CHATBOT USING RAG VECTOR SEARCH AND CONVERSATIONAL AI

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Citizens can often face challenges in accessing appropriate government schemes because information is spread out, there are complicated eligibility criteria, and support is not provided in more than a single language. Such restrictions lead to an increase in ignorance and inappropriate use of public welfare programs, especially among people with low levels of digital literacy or those who do not speak English. This paper presents a smart recommendation system consisting of Retrieval-Augmented Generation (RAG) vector search and conversational AI to provide user-specific government scheme recommendations. The system uses FAISS to search similarities by vectors, Google Generative AI to understand the natural language, and an interface implemented in Fast API to interact with the user. It provides matching of schemes based on profile, eligibility evaluation, multilingual matching and assisted application in English and Tamil. Combination of semantic search and conversational dialogue management will help to support effective recommendations, make government services more accessible, and engage citizens. The experimental findings show increased recommendation accuracy, shortened information search time and increased user satisfaction, which contributes to inclusive access to public welfare programs.

828.FRAUD BUSTER: MACHINE LEARNING FOR SAFER TRANSACTIONS

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The proliferation of digital payment infrastructures has simultaneously amplified exposure to sophisticated credit card fraud, necessitating detection systems that are both highly sensitive and operationally efficient. This paper presents Fraud Buster, an end-to-end machine learning pipeline engineered to detect fraudulent credit card transactions with high recall and controlled false positive rates. The proposed system incorporates stratified data partitioning, rigorous preprocessing through temporal feature extraction and standardization, synthetic minority oversampling via SMOTE to address severe class imbalance, and a comparative evaluation of three supervised learning paradigms: Logistic Regression, Random Forest, and XGBoost. Experimental validation was conducted on a publicly available European credit card transaction dataset comprising 149,999 samples, of which 293 transactions (0.196%) were labelled as fraudulent. Following SMOTE-based resampling, 119,531 synthetic minority-class instances were generated, yielding a balanced training distribution. Quantitative evaluation on a held-out test set of 30,000 samples revealed that Random Forest achieved the most favourable balance across precision (0.6625), recall (0.8983), F1-score (0.7626), ROC-AUC (0.9939), and PR-AUC (0.8588). SHAP-based post-hoc interpretation identified V14 as the dominant predictive feature with a mean absolute SHAP value of 3.182, followed by V4 (1.964) and V12 (1.498). The paper further discusses deployment feasibility through a lightweight REST-based inference service and outlines privacy-preserving extensions via federated learning.

829.DESIGN OF REAL TIME DIGITAL OSCILLOSCOPE USING STM32 MICROCONTROLLER

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Oscilloscope is one of the most important tool used in electronics, to visualize signals as voltage over time. It is a tool that is used in electronics to debug circuits, analyze signal integrity or measure frequency and amplitude. It is a tool used in many fields such as electronics, telecommunications and medical fields. The prototype uses the STM32H723VGT6 microcontroller which has two built-in 16-bit Analog to Digital Converters (ADC), which can be used at 8-bit resolution to get higher sampling rates. The signal sampled from the microcontroller is sent to a computer using the USB interface. The computer runs a program for the GUI which replicates the oscilloscope look. The program is also responsible for receiving and buffering the samples sent by the microcontroller through the USB interface. The program processes the signal according to the controls set on the GUI like time and voltage scaling.

830.AI ENHANCED THERAPEUTIC ASSISTANT FOR LUMBAR HEALTH MONITORING AND SUPPORT

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An increase in back pain caused by lumbar spondylosis and spinal disorders due to improper posture during prolonged screen time and improper ergonomic behavior has been noted. This has led to a rise in chronic musculoskeletal disorders, affecting the quality of life. This project focuses on the design of an AI-based wearable system for lumbar health monitoring. The wearable system will be able to monitor the posture of the user continuously. The proposed system will be designed using an ESP32-WROOM-32 microcontroller for the collection of spinal orientation data. The collected data will be sent to the cloud server using Wi-Fi. The proposed system will be able to perform a posture risk analysis using machine learning algorithms such as Logistic Regression and Random Forest. The proposed wearable system will be equipped with a 18650 Li-ion

battery setup using a battery management shield. The proposed wearable system will be able to send instant notifications for any improper posture.

831.AUTONOMOUS PACKAGE DELIVERY BOT

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The Autonomous Package Delivery Bot is a mobile robot designed to automate short-range delivery tasks in indoor environments such as hospitals, colleges, and offices. Its goal is to minimize human involvement and enable safe, contactless delivery of small packages using intelligent navigation. The system is powered by the Robot Operating System 2 (ROS2) framework, which manages communication between all sensors and control nodes. A LiDAR sensor performs Simultaneous Localization and Mapping (SLAM), creating a real-time map of the surroundings, while the Nav2 stack is responsible for motion planning and navigation. Additional sensors such as ultrasonic modules detect close-range obstacles, and an IMU sensor maintains balance and orientation. The robot's brain is a Raspberry Pi 4, which processes all the data and executes navigation algorithms. Tests in indoor environments show that the bot can autonomously move between destinations, avoid obstacles, and perform deliveries reliably. The system offers a low-cost, scalable solution for automating indoor logistics and can be improved further with AI-based vision, IoT connectivity, and self-charging capabilities.

832.ANALOG IC DESIGN AND PERFORMANCE ANALYSIS OF SCHMITT TRIGGER USING TWO LOGIC FAMILIES

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Since Schmitt Triggers are critical components in signal conditioning, noise filtering, and waveform shaping, efficient design at the IC level is necessary to achieve reliable and stable digital outputs from noisy or slowly varying analog inputs. In this work, a Schmitt Trigger is designed using two CMOS logic families — Static CMOS logic and Pseudo NMOS logic — to identify the optimal design approach based on performance metrics like power consumption, noise immunity, and area efficiency. The implementation is carried out in VLSI technology using the CADENCE VIRTUOSO tool suite at the 180nm technology node. The full design flow, including schematic creation, simulation, layout, DRC, LVS, RC extraction, and GDS file generation, is

demonstrated. Performance analysis reveals that the Static CMOS Schmitt Trigger offers significantly lower average power consumption and better noise immunity, whereas the Pseudo NMOS Schmitt Trigger achieves reduced area and transistor count at the cost of slightly higher power consumption. Overall, the Static CMOS logic is recommended for applications where power and noise performance are critical, while the Pseudo NMOS logic is advantageous in area-constrained designs. This project successfully establishes a comprehensive IC design methodology for Schmitt Triggers and provides insights for future enhancements towards low-power and high-speed VLSI systems.

833.PERSONALIZED DIET RECOMMENDATION USING GRAPH NEURAL NETWORK AND REINFORCEMENT LEARNING

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Personalized nutrition is a key factor in promoting healthier lifestyles and preventing diet-related diseases; however, conventional diet recommendation systems often rely on static rules or generalized dietary guidelines that fail to adapt to individual needs. This paper presents a personalized diet recommendation framework using Graph Neural Networks (GNNs) and Reinforcement Learning (RL), focusing on intelligent decision-making rather than food image detection. The proposed system assumes that food items are already identified and emphasizes optimizing dietary choices based on user-specific health conditions, preferences, and nutritional goals. A User–Food–Health graph is constructed to represent complex relationships among users, food items, nutritional attributes, and health indicators. Graph Neural Network models such as GraphSAGE or Graph Convolutional Networks (GCN) are employed to learn meaningful graph embeddings that capture both structural and semantic dependencies within dietary data. These embeddings are integrated into a Deep Q-Network (DQN) reinforcement learning framework, enabling sequential diet recommendation optimization by maximizing long-term health rewards. The RL agent dynamically adapts recommendations using feedback and evolving user contexts. Experimental analysis demonstrates that the proposed hybrid GNN–RL approach improves recommendation accuracy, dietary adherence, and alignment with individual health objectives compared to traditional methods, highlighting its potential for intelligent personalized nutrition systems.

834.TRANSFORMER-BASED FOOD IMAGE SEGMENTATION AND CALORIE ESTIMATION FOR INTELLIGENT DIETARY MONITORING

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Accurate dietary monitoring plays a vital role in promoting healthy lifestyles, managing chronic diseases, and supporting personalized nutrition planning. Traditional computer vision-based dietary assessment systems largely depend on object detection models, which often fail to capture precise food boundaries and portion sizes, resulting in inaccurate calorie estimation. To overcome these limitations, this research proposes a transformer-based food image segmentation and calorie estimation framework that leverages fine-grained pixel-level segmentation for improved accuracy. The proposed system employs Vision Transformers (ViT) integrated with mask-based segmentation architectures such as Mask R-CNN with ViT backbones or the Segment Anything Model (SAM), replacing conventional detection-based approaches like YOLO. By segmenting food items at the pixel level, the system enables accurate portion estimation, leading to more reliable calorie calculations. The segmented food regions are analyzed using volumetric and area-based measurements, which are mapped to nutritional databases for calorie estimation. Extensive experimental evaluations demonstrate that the transformer-based segmentation approach significantly enhances segmentation precision and calorie prediction accuracy compared to traditional convolution neural network-based detection methods. The proposed framework offers a robust and scalable solution for intelligent dietary monitoring systems, supporting applications in healthcare, fitness tracking, and personalized nutrition management.

835.CURV-SAFE : V2X ENABLED LANDSLIDE AND CONFLICT DETECTION

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In mountain and hill regions, curve roads are a serious challenge for road safety due to low visibility, sharp turning, often resulting in road blockages, potential landslide hazards and high rate of accidents, which are common in places like India. This practical application gives the project a strong foundation and purpose. The project presents Curve-Safe, an advanced landslide detection and warning system coupled with vehicle (V2X) communication for improved safety on curved and mountainous roads. The project integrates multiple engineering and computer science discipline, including Embedded systems: Working with the ESP32 microcontroller and various sensors. Data analysis: Reading and processing data from accelerometer and rain sensors. Actuator control: Programming the automated gates. The system also predicts vehicle collisions at blind curves by sharing trajectory information, thus minimizing the chances of collision in dangerous areas. By merging natural hazard sensing with vehicle communication, Curve-Safe presents a holistic solution for disaster-intelligent transportation systems, enhancing road safety and reliability in risky hilly areas.

836.AGRO AID - A DIGITAL FUNDRAISING AND SUPPORT PLATFORMS FOR FARMERS

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Financial system inefficiencies still persist in agricultural economies, especially among small or marginal farmers. These groups are extremely vulnerable to climate change, diseases, and lack of access to faster capital systems. Existing crowdfunding and microfinancing systems are currently operating without an integration plan of linking these systems with agricultural advice systems. Such systems lack automated verification mechanisms for the campaigns, causing undue delay in the disbursement of funds and creating a mentality of mistrust among the donors. Paper overview: AGRO AID is a fundraising platform for the agriculture industry, linking fundraising with the proposed agriculture advice system. AGRO AID includes an automated campaign system and is equipped with various features such as the application of a rule-based urgency score system, structured data validation, as well as the monitoring of transactions to ensure authenticity, traceability, and rapid fund mobilization. Simulations of AGRO AID show the ability of the proposed system to boost the rate of campaign system construction, as well as the efficiency and trust of the system among the donors through the realization of real-time transparency mechanisms. This ensures authenticity, traceability, as well as the quick mobilization of funds. It is also modular with scalability and robustness, with dedicated tiers for presentation, application logic, analytics, persistency, as well as secure payments. Simulation experiments confirm that the platform improves the speed of campaign creation, as well as the efficiency of transactions and donors' trust through the inclusion of real-time transparency aspects. Such a platform bridges the gap from ascertaining the problem faced by the farmer to providing the required financial aid.

837.NOVEL ANOMALY-DRIVEN HYBRID DEEP LEARNING FOR IOT TIME-SERIES PREDICTION AND ADAPTIVE SIGNAL ANALYSIS

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Air pollution represents a major hazard for human and environmental sustainability while current monitoring stations are expensive, sparse in coverage, and not capable of real-time forecasting. To address this issue, this project presents an IoT and AI-powered air quality monitoring and forecasting system. An MQ-135 sensor connected to an ESP8266 microcontroller captures the pollutants (CO₂, NH₃, NO_x) and uploads them onto the ThingSpeak cloud for real-time visualization and distant access. The suggested system optimally enhances the quality of the collected data by utilizing Air Variational Mode Decomposition (AVMD) for the suppression of noise and extraction of trustworthy features. Spatial correlations are detected by a Convolutional Neural Network (CNN) while a Quantum- enhanced Long Short-Term Memory (QLSTM) network captures the temporal dynamics for the attainment of high accuracy forecasting. The framework is implemented in MATLAB and incorporates sensing, preprocessing, and forecasting seamlessly. The novelty is the AVMD-CNN-QLSTM hybrid architecture in which the raw IoT signals are translated into actionable knowledge for the support of smart cities and smart maintenance and environment sustainability planning.

838.A GEOSPATIAL MULTI-CRITERIA FRAMEWORK FOR EVALUATING CLIMATE- INDUCED LANDSLIDE SUSCEPTIBILITY

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Landslides are unpredictable natural hazards that cause significant damage to landforms and result in substantial ecological losses. A critical component of effective landslide hazard management involves mapping susceptibility areas to reduce the vulnerability of populations living in landslide-prone regions. This study employs a GIS-based Analytical Hierarchy Process (AHP) to develop and evaluate a landslide susceptibility map (LSM) for the Kodagu region by analyzing multiple geo- environmental parameters. The analysis utilizes a newly developed landslide inventory dataset that documents landslide incidents in Kodagu, which is publicly available through the <https://github.com/Arpithaachaiah6/Landslide-inventory-for-the-2018-storm-event-of-Kodagu-in-the-Western-Ghats>. The study incorporates nine location-specific landslide conditioning factors. The analysis identifies elevation, slope, and rainfall as the primary factors influencing landslide occurrence in Kodagu. Based on expert knowledge integrated through the AHP technique, the results show that 603.77 km² of the study area falls within a very high-risk zone, while approximately 1,536.02 km² and 1,519.26 km² are classified as moderate and high-risk zones, respectively. The results reveal that major landslides in Kodagu have predominantly occurred in areas characterized by mixed forest plantations, natural forests, and along roadways. The findings from this AHP-based analysis provide valuable insights that could significantly contribute to risk mitigation strategies and help reduce fatalities in Kodagu's landslide-prone areas.

839.CLOUDBURST EARLY WARNING AND ALARM SYSTEM

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Cloudburst is described as an unexpected heavy rainfall that occurs in a very short period of time and over a very small area; it usually happens in mountainous areas, causing flash floods, landslides, and massive damage to life and property. The predictability of cloudbursts is, at present, constrained by the existing early warning systems that are heavily dependent on the existing inadequate rain gauge stations, the time delay in getting localized weather updates from the meteorological department, and low resolution data. Thus, the prediction of cloudbursts at a specific location in a timely manner is extremely difficult. The proposed project team would like to address this issue by developing an early warning and alarm system for cloudbursts using IoT technology, which is integrated with cloud computing and artificial intelligence. Unlike the existing weather monitoring systems, this proposed system uses multiple sensors to obtain immediate environmental data. By using rainfall, temperature, humidity, atmospheric pressure, and soil moisture sensors connected to either ESP32 or NodeMCU modules, this proposed system is able to monitor live local weather/ground conditions and transmit the information to the Cloud for storage and further analysis by an AI/ML algorithm based on both current and historical data, and identifies whether there are abnormal levels of rainfall and/or saturation; both of which would result in an alert for a potential cloudburst or flash flood event. The IoT devices are able to transmit real-time information to the cloud using low-cost sensors, and Python is able to provide a user-friendly physiological display of live information, historical information, and forecasting information. The system is able to provide alerts over the Internet when potentially dangerous conditions are expected due to current environmental conditions. A buzzer is also triggered locally when a cloudburst is identified. One of the benefits of this technology is that it enables localized real-time detection of cloudbursts using relatively cheap IoT devices and cloud-based data analysis. The benefit of monitoring soil moisture levels is that it increases the accuracy of the detection system because it is an additional piece of information about the level of ground saturation. This technology provides a better level of accuracy and scale of detection of cloudbursts compared to the existing system.

840.IMPLEMENTATION OF INTELLIGENT AGRICULTURAL SUBSIDY RECOMMENDATION APPROACH FOR IDENTIFYING APPROPRIATE FORMERS USING ML TECHNIQUES

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Subsidy on various types of items is more important in agriculture filed to optimize risk factors in production and also support to farmer to cultivate farming with extra benefits and with additional security. The traditional subsidy allocation technique heavily depends on physical verifications, checking large number of rules, verifying a greater number of constraints, these factors delayed the complete subsidy process that in turn facing the issue of identifying appropriate subsidy beneficiaries, and also shows inefficiency in utilizing government subsidy schemes. The farmers data samples are increased day by day with many features and this provide an opportunity to develop an intelligent technique to identify and allocate subsidies to needy farmers on time. In this research we propose an ML based SSR (Smart Subsidy Recommending) approach for allocation various kinds of subsidies, and the main objective is to develop efficient and transparent subsidy recommending techniques by analyzing complete farmer list. In our model, we have taken certain features like previous repayment histories, farmers economical situations, climatic conditions for crop, availability of farming tools, features of soil, characteristics of land, and farmer conditions to allocate various types of subsidies. The ML-SSR technique starts with preprocessing of farmers data, identification of feature vectors, remove irrelevant features with help of feature engineering approaches, allocation of data samples to various stages of ML, calculates various types of indices based on farmers data samples, and finally decide the list of eligible formers for different types of subsidies. Performance of ML-SSRS method is calculated and compared with RBEEA, EAA, ABSS, and TLR subsidy recommended approaches. The method we developed is useful to many government agencies to identify list of eligible farmers without any discrepancies and also prepare the list by maintaining transparency.

841.IV BAG MONITORING AND ALERT SYSTEM

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IV fluid management is a very important component of patient care because it gives drugs and liquids simultaneously into the bloodstream. The nurses manually check of IV fluid levels in the hospitals which can be extremely time-consuming and may cause human errors. Unless the fluid level is monitored it can cause severe troubles dehydration, air embolism or treatment interruption. This task presents a proposal of an automated IV

Bag monitoring and alert system which utilizes a load cell sensor and ESP32 microcontroller to continuously measure and monitor the stage of IV fluids in real time. when the fluid level becomes low an alert is created by a buzzer to inform the physicians, nurses and medical staff. future improvements objective will include IoT-based remote, mainly supervising so that scientific group of workers can oversee several patients in one location. The proposed system goals to enhance patient protection reduced workload on healthcare workers and IV monitoring more efficiently and scalable to different healthcare settings.

842.COMPREHENSIVE WEB BROWSER EXTENSION FOR PROACTIVE TESTING AND THREAT MITIGATION: A MULTI-LAYERED CLIENT-SIDE DEFENSE FRAMEWORK

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The modern web browser has become a rich, complex runtime—it's the primary gateway for cloud services, banking, and communication. That same complexity makes browsers an attractive target for attackers using advanced techniques such as Zero-Day Phishing, DOM-based Cross-Site Scripting (XSS), and Session Hijacking. Traditional perimeter defenses that rely on network inspection or static blacklists are increasingly ineffective against threats that execute inside the browser's encrypted context. This paper describes the design, implementation, and evaluation of a comprehensive browser extension that provides layered, end-to-end protection at the client side. The proposed framework combines five coordinated modules: (1) an Automated Malicious Site Detector and Interceptor (AMSDI) based on an in-browser Random Forest classifier; (2) a Web Access Lock (WAL) that leverages Generative AI for context-aware decisions; (3) a real-time DOM Content Inspection engine; (4) a heuristic Cookie and Session Security Auditor; and (5) a Threat Quarantine sandbox for suspicious downloads. Experimental evaluation shows the AMSDI module reaches a detection accuracy of 97.8% while keeping inference latency negligible (under 50 ms), demonstrating the solution is both low-latency and effective while conforming to Manifest V3 constraints.

843.A HYBRID EFFICIENTNETV2B3–VIT DEEP LEARNING MODEL FOR ENHANCED POTATO PLANT DISEASE DETECTION IN PRECISION AGRICULTURE

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Farmers play an important role in advancing the development of agriculture, which is the backbone of the Indian economy, provides livelihoods for a large part of the population, and contributes to national growth [7], [14]. Although early and accurate detection of plant diseases is crucial to maintaining crop yield, traditional visual inspection approaches for disease diagnosis are laborious, time- consuming , and susceptible to human error [9], [16], [24]. Severe injuries to plant parts caused by biotic stress agents, such as microorganisms (bacteria, fungi, and viruses), result in reduced plant fitness [4], [19]. Using existing machine learning and deep learning, we often encounter challenges such as over fitting, low accuracy, and limited generalizability across diverse real-world environments [10], [15], [23]. In order to overcome these limitations, a new hybrid deep-learning architecture, namely EfficientNetV2B3-ViT, for potato leaf disease detection, that combines EfficientNetV2B3 and Vision Transformer (ViT) model, is proposed in this study [3], [5]. The EfficientNetV2B3+ViT framework combines the state-of-the-art feature extraction capabilities of a convolutional neural network with the global attention of a transformer architecture [1], [6], [11]. Together, they combine the potential to achieve high discrimination between healthy and diseased leaves while reducing error [2], [21], [22]. This hybrid model must demonstrate better scalability, adaptability, and classification accuracy to provide a proper solution for precision agriculture [17], [18], [25]. These results highlight the potential of advanced deep-learning methods to revolutionize agricultural diagnostics, providing a scalable tool for automated, high-throughput leaf disease identification and opening avenues towards sustainable crop management approaches in the future [8], [13], [20].

844.VITAL AND ENVIRONMENTAL MONITORING USING PORTABLE MEDGUARD SYSTEM

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The Human Health Monitoring System using Arduino integrates an ECG sensor, DHT sensor, and LCD display to create a compact and efficient solution for real-time health tracking. The ECG sensor monitors the heart's electrical activity, providing critical insights into the user's cardiovascular status. Simultaneously, the DHT sensor measures environmental parameters such as temperature and humidity, which can affect overall well-being. By combining these sensors with an Arduino microcontroller, the system ensures accurate data acquisition and processing, which is then displayed on an LCD screen for easy interpretation. This low-cost and user-friendly health monitoring system is designed to support continuous observation, making it ideal for home-based or remote patient care. The real-time data display allows users or caregivers to identify potential health issues promptly and take necessary actions. Furthermore, the system's modularity allows for easy upgrades or integration with wireless communication modules for remote data access, making it a practical and scalable solution in the field of biomedical monitoring.

845.DECENTRALIZED AI-POWERED SELF-HEALING ZERO-TRUST DIGITAL IDENTITY & ACCESS MANAGEMENT SYSTEM WITH DEEPFAKE-RESISTANT MULTIMODAL BIOMETRICS AND PREDICTIVE CYBER DEFENSE

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Modern fintech ecosystems face escalating risks from sophisticated deepfake impersonations and the inherent vulnerabilities of legacy OTP/PIN-based verification systems. This paper proposes a novel Decentralized AI-Powered Self-Healing Zero-Trust framework to secure digital identity and access management. The system integrates a deepfake-resistant biometric engine using AI-based liveness and artifact detection to neutralize photo and video replay attacks. By replacing traditional verification with fingerprint-only biometric

authorization, the system eliminates reliance on interceptable OTPs. Operating under a continuous Zero-Trust architecture, the system manages user data in a decentralized ledger to prevent single points of failure. Experimental results indicate that the system achieves a 99.2% accuracy in threat detection, significantly enhancing fraud resistance in modern financial applications.

846.AI-POWERED WEB APPLICATION FOR EVENT PLANNING AND MANAGEMENT

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Organizing a variety of events, such as weddings, birthday parties, business meetings, cultural programs, etc., has become difficult in today's fast-paced digital world. It takes a lot of time and human labor to plan things like hall reservations, food, décor, photography, music/DJ, transportation, etc. independently for every event. Delays, inaccurate information, and mistakes in expense estimates are the outcomes of this. This project introduces an integrated intelligent system named “Event Planning and Management through Planetary Intelligence (AI) Based Web Application” in an effort to address these issues. On a single platform, this web application combines all the services, including transportation, invitation design, music/DJ, decorator, photographer, caterer, and hall. This system gives Personalized Recommendations after analyzing the user's preferences, budget range, and event kind using AI algorithm and Machine Learning technology. Additionally, users' questions are instantly answered via the Chatbot function, which is based on Natural Language Processing (NLP). Furthermore, Automated Budget Planning and Data Analytics functions facilitate cost control. This minimizes human error and cuts planning time by up to 65%. All things considered, this AI-based event management web application is a modern, effective, and time-saving solution. In event management, it increases user pleasure, accuracy, and technological sophistication.

847.MULTIMODAL EMOTION RECOGNITION FOR MENTAL HEALTH DIAGNOSIS AND RESPONSE SYSTEM USING DEEP LEARNING

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The limitations of conventional emotion recognition systems have been brought to light by the rising demand for scalable mental health support. This paper suggests MindCompass AI, a novel multimodal emotion recognition system, as a solution to these issues. This system combines ConvNeXt-Tiny with Spatial Attention for visual input, Wav2Vec2.0 with XGBoost for auditory processing, and Mental-RoBERTa for textual analysis. A Residual Attention Fusion Network using dynamic reliability weighting is used to integrate these features. SHAP and LIME offer real-time visual interpretations of model decisions to guarantee clinical transparency.

Additionally, we present Guardian AI, a sophisticated retrieval-augmented framework that uses the context gathered from the emotional recognition process to provide tailored, medically based psychological support.

848. AUTOMATIC GENERATION OF SEGMENTED EDUCATIONAL VIDEOS FROM TEXT USING NLP AND GENERATIVE AI

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The increasing demand for engaging and accessible digital learning content has highlighted the limitations of traditional text-based educational materials. This paper presents an AI-based system that automatically converts educational text documents into segmented visual narration videos using a fully automated multimodal pipeline. The proposed framework integrates document parsing, Natural Language Processing (NLP), Large Language Models (LLMs), Text-to-Speech (TTS), and diffusion-based Text-to-Image (TTI) generation to transform static documents into structured, narrated video modules. Educational content is processed at the sentence level to enable fine-grained synchronization between narration, visuals, and subtitles. A robust primary–fallback strategy is employed across LLM, TTS, and image generation modules to ensure reliable operation. Experimental evaluation demonstrates that the system produces coherent and pedagogically suitable educational videos while significantly reducing manual effort and content production time through full pipeline automation. The proposed solution is scalable, cost-efficient, and well-suited for e-learning platforms, educators, and inclusive digital education delivery.

849. DETECTING SMART CAR PARKING SLOTS WITH YOLO AND REAL TIME HEAT MAP OF OCCUPANCY

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Fast urbanization and the rapid increase of vehicle density have complicated the operations of the urban parking infrastructure. Poor use of space also leads to long waiting time of vehicles on the road, road congestion and higher environmental footprint. An overview of a vision-based parking occupancy detection framework that uses the YOLO-based detection paradigm and real-time spatial use visualization is described. Video streams obtained through fixed surveillance units are continuously obtained and localized frame-wise on vehicles through convolutional inference. It matches the identified vehicle positions with known parking area boundaries to obtain slot-level occupancy classification geometrically by visualizing occupancy heat density by dynamically updating the occupancy heat distribution map, the changes in chromatic intensity being used to represent empty, partially used, and oversaturated parking area. Experimental results on annotated parking data support the inference framework at 96.4% average accuracy and the deployed implementation framework is at 94.8% accuracy in actual operation at varying illumination levels and occlusions. The results of the analysis show the high level of slot classification, the minimized number of computational latency, and the ability to maintain the performance consistency. The given research scheme creates an effective, scalable, and financially feasible remedy of intelligent parking regulation in high-technology transportation infrastructure.

850. IOT AND RSSI BASED DYNAMIC BUS SCHEDULING AND PASSENGER DETECTION

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Public transport systems in cities are generally plagued by issues such as overcrowding, high waiting times, and poor bus scheduling efficiency. This study introduces an Intelligent Passenger Detection and Bus Management System that helps monitor the real-time needs of passengers and efficiently manages bus distribution. The system enables passengers to input their destination via a keypad and authenticate it using an RFID device to prevent duplicate entries. The number of passengers at each destination is constantly updated and processed. If the number of passengers exceeds a certain limit for a destination, an alert is sent to the bus depot via the IoT communication. Additional buses can then be sent to efficiently address congestion issues. The proposed system also uses RSSI values to determine the proximity of buses and GPS technology to track bus movements in real time [2], [3]. Traditional public transport systems mainly rely on fixed timetables and depot-based scheduling models that do not adapt dynamically to real-time passenger demand [1]. The proposed system helps improve the efficiency of public transport systems by moving away from traditional bus scheduling systems and towards a more efficient transport system that reduces the waiting times of passengers and increases their overall satisfaction.

851.SMART DNS THREAT FINDER A MULTI-RESOLVER FRAMEWORK FOR AUTOMATED VULNERABILITY ASSESSMENT AND THREAT SCORING

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The Domain Name System (DNS) remains a primary vector for cyberattacks due to its inherent lack of built-in data origin authentication. Despite the introduction of security extensions like DNSSEC and email authentication protocols such as SPF, DKIM, and DMARC, widespread misconfigurations and slow propagation often leave organizations vulnerable to cache poisoning, phishing, and man-in-the-middle (MitM) attacks. This paper presents Smart DNS Threat Finder, an automated diagnostic framework designed to evaluate the security posture of a domain's DNS infrastructure. The proposed system utilizes a multi-resolver verification engine to query disparate public and authoritative DNS servers, enabling the detection of record inconsistencies and Time-to-Live (TTL) drift. The framework integrates a comprehensive validation suite for DNSSEC chain-of-trust integrity and an automated parser for email security policies to identify spoofing vulnerabilities. A key contribution of this work is a weighted Threat Scoring Algorithm that quantifies technical DNS risks into an actionable security metric. Experimental validation demonstrates that the tool effectively identifies misconfigurations across diverse top-level domains (TLDs) with high precision. The system provides administrators with an interactive dashboard and detailed forensic reports, bridging the gap between complex DNS telemetry and proactive threat mitigation.

852.UNCERTAINTY-AWARE SIGN LANGUAGE RECOGNITION USING SPATIO-TEMPORAL SKELETAL GRAPH LEARNING

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Sign language recognition is a crucial aspect of communication for the deaf and hard of hearing. This project presents a system that incorporates spatio-temporal skeletal graph learning to model human joints as graphs to represent patterns of motion. A graph convolutional network is used to extract features from skeletal data, and uncertainty estimation is employed to provide confidence in predictions. This system allows for real-time recognition with enhanced accuracy.

853.AN ML-BASED SLEEP PATTERN ANALYSIS FOR EARLY DETECTION OF MOOD SWINGS AND CARDIOVASCULAR RISK

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Disturbances in sleep and irregularities in circadian rhythms are being increasingly identified as precursors to mood disorders and cardiovascular diseases. However, most current health monitoring systems are based on individual physiological parameters, rule-based systems, or uninterpretable machine learning models, which makes them less effective in terms of early risk prediction and clinical interpretation. An intelligent machine learning-based health monitoring system for the early prediction of mood swings and cardiovascular risk through continuous sleep and physiological signal analysis. Circadia is a systematic data acquisition, processing, prediction, and visualization platform. Physiological signals obtained from wearable sensors such as heart rate, sleep patterns, hydration levels, and skin temperature are preprocessed to remove noise, normalized, and then converted to model inputs. The inputs are then processed by a CatBoost classification model, chosen for its resistance to overfitting, capability to process mixed data types, and high performance even on small datasets. The model predicts health conditions to be normal, warning, or critical and uses SHAP-based interpretability for transparent predictions. The system is developed using a lightweight service-oriented architecture with a FastAPI backend and React.js frontend, which allows for real-time analytics and visualization without the need for complex orchestration frameworks. Experimental results using wearable-derived datasets show stable classification performance, accuracy across risk categories, and meaningful feature attribution. The findings suggest that the combination of explainable machine learning and wearable health data can facilitate proactive and preventive healthcare for mood and cardiovascular disorders.

854.TWO-STAGE ENERGY EFFICIENT PV-BATTERY LOAD CONSUMPTION BASED ON COST-EFFECTIVE SMART GRID

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This paper presents the design and implementation of a two-stage energy-efficient photovoltaic (PV)–battery system for cost-effective smart grid applications. The proposed system consists of a DC–DC boost converter (12 V–48 V) with a single-phase DC–AC inverter (230 V, 50 Hz) to supply AC loads. A lithium-ion battery 5 W, 12 V PV panel and a 12 V, 7 Ah is used for energy generation and storage. The boost converter is used to

achieve a voltage gain with 91.8% efficiency at rated voltage, while the inverter delivers 230V AC. An Arduino-based monitoring system is used to measure the real-time voltage (0–50 V range) and current (0–5 A range) using voltage divider and sensors. The proposed system offers a low-cost and scalable solution for residential renewable energy applications.

855.A DECENTRALIZED SMART MULTI-SERVICE BOOKING AND RESERVATION MANAGEMENT SYSTEM USING CLOUD COMPUTING

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Modern service industries often suffer from fragmented reservation ecosystems, forcing users to navigate disparate platforms for accommodations, wellness, and logistics. This fragmentation leads to operational silos, data inconsistency, and a disjointed user experience. In this paper, we propose a Smart Multi-Service Booking and Reservation Management System designed to centralize diverse service categories into a single, cohesive architecture. Utilizing a microservices-based framework and an intelligent resource- allocation algorithm, the system dynamically manages real-time availability across varying service intervals (e.g., hourly vs. daily). Key features include an automated cross-service recommendation engine and a unified dashboard for multi- tenant administrative control. Our implementation demonstrates a significant reduction in booking latency and a 15% improvement in resource utilization compared to traditional single-service models. Experimental results indicate that the integration of smart scheduling logic effectively mitigates overbooking risks while enhancing consumer engagement through personalized service bundling. This research provides a scalable blueprint for businesses seeking to modernize their digital infrastructure through unified service orchestration.

856.REAL-TIME POTHOLE DETECTION AND MEASUREMENT USING COMPUTER VISION

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Potholes are a serious safety hazard that damage vehicles and create traffic bottlenecks. To solve this, we need a solution that detects them the moment they appear. In this paper, we propose RoadVision AI, an efficient framework for pothole detection and distance estimation, built using the YOLOv11 architecture integrated within a custom computer-vision workflow. Our technique utilizes a smartphone camera mounted on the dashboard of the vehicle to detect potholes, obtain estimates of where the pothole is in the forward distance from the vehicle, and compute the diameter of the pothole using camera geometry and camera intrinsics. Experimental results on a custom dataset demonstrated strong results with high accuracy and precision in outdoor road conditions. The main contribution of this work is combining object detection with real-time measurement in space, for providing actionable information that can be useful for preventative maintenance of the roadway, as well as for automated vehicles.

857.SUSTAINABLE CONCRETE MANUFACTURING: EVALUATING THE VIABILITY OF ALTERNATIVE WATER SOURCES AND THEIR IMPACT ON DURABILITY

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Freshwater preservation and conservation are becoming increasingly critical as global populations rise. Concrete production requires significant amounts of freshwater. This research investigates the use of Harvested rainwater (HRW), Stormwater (SW), Borewell water (BW), Potable water (PW), and Seawater in concrete manufacturing, following relevant standards and analyzing the chemical properties of these water sources. The study evaluates fresh and mechanical concrete properties such as workability, compressive strength, split tensile strength, and flexural strength at 7, 28, and 90 days. An accelerated testing method was developed to evaluate concrete's resistance to physical sulfate attack, specimens were partially submerged in 10% sodium sulfate solution and fully submerged in 30% sodium sulfate solution. Mass loss and expansion were identified as reliable indicators of deterioration. Additionally, concrete was exposed to a 5% NaCl solution for 180 days, and corrosion potential was monitored. Microstructural analysis revealed that the improved durability of concrete made with HRW and SW qualities is due to reduced ingress of harmful agents, resulting in a denser, more compact microstructure in the hardened composites. Conventional water is ideal for concrete mixing because of its well-balanced

composition and minimal risks, ensuring effective hydration. Nevertheless, harvested rainwater and stormwater are viable options for concrete mixing, as they do not adversely affect strength or durability.

**858.PAW SENSE: REAL-TIME PET EMOTIONAL
STATE CLASSIFICATION USING DEEP LEARNING
AND WEBCAM-BASED VISUAL CUES**

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Pets communicate their emotions in terms of face and body language. But interpreting them visually is often challenging for new or non expert pet owners. Miscommunication of this nature may result in a lack of proper care and a poor state of well-being of the pets. Herein, a real-time pet emotion classification system using deep learning techniques along with pet vision cues obtained from a webcam is proposed. Within the scope of this paper, an application based on web technology for collecting images of pets in real time is developed. Using a deep learning technique known as the MobileNetV2 model, emotion classification is anticipated. Experimental results validate that there is an improvement in classification accuracy using the proposed lightweight model with fewer computational complexities. Moreover, this technique may be very useful in improving interactions between humans and their pets and may also enhance the state of well-being of their pets.

**859.SPECTRUM SENSING FRAMEWORK FOR
WIRELESS INFORMATION TRANSMISSION
BY DEEP CNN–BIGRU–BIRNN FOR
COGNITIVE RADIO SENSOR NETWORKS**

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Modern wireless communication systems with cognitive radio use spectrum sensing to detect and analyze the utilization of radio frequency bands, so that devices can be aware of available frequencies for interference-free communication [1], [18]. This enables them to implement an efficient management of spectrum strategy, allowing them to identify free channels and prevent interference [1]. For this reason, it is imperative to have such a capability regardless of whether a spectrum environment is congested and dynamic, because efficient techniques in spectrum sensing will ensure seamless operation of wireless devices without any interference [16]. In this project, we propose a method for integrating CNN and BiGRU networks. The CNN layer identifies the temporal signal patterns over time, and the GRU layer optimizes efficiency in learning and adapting to the signal characteristics [14]. Moreover, the model includes the BiRNN layer, which helps the model identify the signal sequence patterns in both forward and backward directions. This integrated network is strong and flexible enough to do good spectrum sensing, which improves both spectrum utilization and overall wireless communication performance in environments that change quickly [13], [17]. We will evaluate the hybrid method using performance metrics. The performance of the suggested method will be improved with the Hybrid architecture, which means the potential of the Hybrid technique in analyzing and sensing the spectrum in WSNs.

860.FINITE EARTH: A WEB3 MULTIPLAYER STRATEGY GAME FOR SUSTAINABLE RESOURCE MANAGEMENT

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Finite Earth is a browser-based multiplayer strategy game that models the use of shared resources in a finite setting. Players control nations and compete for land, materials, and food. Every action affects a common ecosystem. The game runs real-time simulation through SpacetimeDB and stores global forest, carbon, and tile

ownership on the MegaETH test network. Soulbound tokens track territory for the leaderboard. Players gain short-term rewards from mining and farming. These same actions reduce forest and raise carbon. Restoration reverses part of the damage at a resource cost. All players lose if the planet collapses. Players win only after sustained recovery. This structure ties personal progress to group survival and supports study of collective behavior inside a competitive system. Quantitative evaluation across multiple simulation runs demonstrates consistent ecosystem degradation under exploitative expansion strategies, while coordinated restoration significantly improves recovery probability. The results validate the system's ability to model collective-risk dynamics under competitive incentive structures.

861.EDUGEN-AI: CONCEPT CENTERED ADAPTIVE LEARNING SYSTEM FOR ACADEMIC MASTERY

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EduGen AI is an AI-assisted personalized learning platform designed to support engineering students in improving conceptual understanding and maintaining consistent study habits. In the system, faculty upload syllabus topics, students interact with a bilingual (English–Tamil) conversational tutor through text or voice, and adaptive quizzes reinforce learning using immediate feedback. The platform applies learning principles such as active recall and spaced repetition inspired by the Ebbinghaus Forgetting Curve, while a gamified study timer and progress tracking encourage regular engagement without increasing cognitive load. Unlike general chatbots, EduGen AI generates responses grounded in instructor-provided academic materials, ensuring syllabus-oriented explanations and reducing irrelevant answers. A preliminary classroom deployment indicated higher participation frequency, improved quiz performance, and increased learner confidence during self-study sessions. Accessibility features including offline support and transparent reasoning further enhance usability and trust, demonstrating how AI can function as a guided learning assistant that promotes disciplined learning behaviour while remaining scalable for educational environments.

862.AI-BASED AUTOMATIC ARTWORK GENERATION FROM SOURCE CODE STRUCTURE

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The rapid evolution of Generative AI has bridged the gap between natural language and visual arts; however, the direct synthesis of aesthetic artwork from functional source code remains an underexplored frontier. This paper proposes Code2Art, a novel framework designed to transform programming logic and structural syntax into high-fidelity generative art. Unlike traditional text-to-image models, our approach utilizes a Graph Neural Network (GNN) to encode the Syntax Tree (AST) of the input code, capturing both structural dependencies and algorithmic flow. These embeddings are subsequently mapped onto a latent diffusion space to guide the generation of visual textures and geometries that reflect the complexity of the underlying software. We evaluated the framework across various programming paradigms, including functional and object-oriented scripts. Experimental results demonstrate that Code2Art achieves a 34% increase in structural coherence compared to standard prompt-based methods, as measured by a custom "Logic-Visual Correlation" metric. Furthermore, qualitative user studies indicate that the generated artworks effectively communicate the "mood" and "complexity" of the source code, offering a new medium for software visualization and digital expression in the era of AI-driven creativity.

863.NEXAI: AN EXECUTION-DRIVEN APPROACH TO AI-BASED RESOURCE MANAGEMENT AND INTELLIGENT CONTROL

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Modern computing systems often face dynamic, constrained resources. Static scheduling and rule-based controls struggle to keep systems efficient and stable. Reinforcement learning offers adaptive control, but its fixed policy structures and reward engineering limit flexibility in system-level decisions. This paper presents a conceptual execution-driven framework inspired by self-programming principles. In this framework, artificial intelligence generates and revises control logic for adaptive resource management. Instead of learning numerical parameters, the approach treats executable control logic as the main optimization object. A stateless language model generates task-prioritization strategies. It uses structured execution feed-back derived from system behavior. The framework is evaluated using a simulated resource-constrained environment. Experimental results demonstrate improved resource utilization and enhanced stability when compared to static control policies. The findings suggest that execution-driven AI can serve as a practical alternative to reinforcement learning for intelligent resource management and control, particularly in systems where adaptability and Resilience is critical.

864.LEVERAGING GENERATIVE AI TO IDENTIFY AND REDUCE MEDIA BIAS

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Media bias has a critical influence on establishing the perception of the public since it affects the way news agencies present events, entities, and stories. The dynamic nature in the development of digital news material is rendering manual detection and correction increasingly impractical. In this study, the authors examine how media bias (textual news reporting) can be identified and eliminated through generative artificial intelligence (AI). Our suggested two-stage framework utilizes large language models (LLMs) to detect signs of bias by using entity-level sentiment analysis, framing assessment, and asymmetric emphasis detection, and then uses controlled generative neutralization of biased text. Empirical data on the use of multi-source news articles related to the same stories indicate that the suggested framework decreases the entity-level sentiment variance by 46.1% and framing divergence by 44.3% following the process of generative neutralization and preserves the factual consistency. This indicates that generative AI is capable of recognizing the presence of cross-source bias and re-formulations to produce balanced reformulations devoid of a significant information distortion. The analysis of the framework is based on a controlled collection of multi outlet news articles over constrained time periods to establish a consistent temporal match between events and their coverage. Such issues as model-induced bias, over-neutralization, and ethical, technical, and practical challenges are also discussed with the stress on responsible implementation and human control.

865.DESIGN AND ANALYSIS OF NATURE-INSPIRED PETAL AND LEAF SHAPED MULTIBAND WEARABLE ANTENNAS FOR BIOMEDICAL APPLICATIONS

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This paper presents the design and analysis of two nature-inspired multiband wearable antennas based on petal-cluster and leaf-meander geometries for biomedical applications. The proposed antennas exploit biomimetic structures to enhance electrical length, improve current distribution, and achieve compact multiband operation suitable for wireless body area networks (WBANs). Both antennas are modeled and analyzed using ANSYS HFSS on an FR-4 substrate, with a microstrip line feed for 50- Ω impedance matching. The petal-cluster antenna exhibits resonances at 3.63, 5.00, and 6.45 GHz, while the leaf-meander antenna provides four distinct resonant bands at 3.125, 3.765, 4.067, and 4.903 GHz. In all operating bands, the antennas demonstrate return loss values better than -10 dB and VSWR below 1.5, indicating excellent impedance matching and efficient

power transfer. The simulated gains are in the range of 4–5 dB with stable broadside radiation characteristics, making the designs suitable for on- body and off-body biomedical communication. Near-field and far-field analyses confirm effective electromagnetic energy distribution and consistent radiation behavior. The results show that nature-inspired petal and leaf geometries provide an effective approach for compact, multiband, and efficient wearable antennas, offering strong potential for healthcare telemetry, biomedical monitoring, and next-generation WBAN systems.

866.AUTOMATED LUNG AND COLON CANCER DETECTION USING HYBRID ATTENTION GUIDED CNN

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Cancer has been a significant worldwide health challenge considering its high aggression, spread, and inability to respond to the traditional therapies. Lung and colon cancers need to be predicted early and accurately in order to increase chances of survival and treatment results. The project is a computationally efficient deep learning system that can be used in the automated detection of lung and colon cancers through the use of histopathological images. Training and validation with a large dataset of 25,000 pictures and five categories was used. The model proposed is the use of a Long Short-term Memory (LSTM) network to gain knowledge of discriminatory sequences of spatial features based on image representations. Selective contrast enhancement was selected in order to alleviate performance shortcoming in classes, that is, to improve the quality of feature with minimal complexity of computation. The framework had the total classification accuracy of 99.2, which attests to a great deal of robustness, degree of reliability, and prospects of the practical implementation in the computer- assisted cancer diagnosis systems.

867.DESIGN OF BROADSIDE MICROSTRIP PATCH ANTENNA WITH EBG STRUCTURE TO INCREASE GAIN

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Microstrip patch antenna arrays are used extensively in X-band radar systems because of their low profile and lightweight structure, which makes them easy to fabricate. However, due to the high density of the antenna array structure, there is a high level of mutual coupling between the adjacent antenna elements. In this paper, a design of a 10 GHz broadside microstrip patch antenna array with Electromagnetic Bandgap (EBG) structures to reduce the mutual coupling between the antenna elements is presented. From the simulation results, it can be noted that the performance of the antenna can be improved significantly, and it can be applied in weather radar systems, marine navigation radar systems, and surveillance radar systems, Insertion of EBG structure results 2dB increment in Gain.

868.AUTOMATED PRACTICE INTERVIEW: A NEW EPOCH IN ASPIRANT DEVELOPMENT

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Automating the decision-making processes in interview evaluation systems has grown more crucial to guarantee consistency, scalability, and equity in candidate evaluation. This study presents a classification framework based on Deep Learning, utilizing an Artificial Neural Network (ANN) to forecast interview actions by analyzing candidate performance metrics like accuracy and confidence. The suggested system is developed as a Multi-Layer Perceptron (MLP) employing the TensorFlow Keras Sequential framework. The dataset is preprocessed by normalizing features with StandardScaler and encoding target labels categorically to improve model performance. The structure of the ANN includes two fully interconnected hidden layers utilizing Rectified Linear Unit (ReLU) activation functions to represent nonlinear associations in the data. Dropout regularization is added to alleviate overfitting and enhance generalization ability. The output layer employs a Softmax activation function for multi-class classification tasks. The network employs the Adaptive Moment Estimation (Adam) optimization algorithm along with categorical cross-entropy loss function to achieve effective convergence and enhanced predictive accuracy. Experimental findings show that the suggested ANN-based deep learning model successfully identifies intricate relationships between input performance metrics and related interview action results. The trained model attains acceptable classification accuracy on new test data and is preserved for use in real-time decision-support systems. The suggested method provides a scalable, data-informed, and automated answer for predicting interview policies intelligently and recommending actions.

869.AI-POWERED HEALTHCARE CHAT PLATFORM FOR PATIENT ENGAGEMENT & APPOINTMENTS

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Healthcare institutions face challenges in managing patient communication and appointment scheduling efficiently. Traditional systems rely heavily on manual coordination, leading to delays, increased administrative workload, and increased patient dissatisfaction. This paper proposes an AI- powered healthcare chat platform that automates patient interaction and appointment management using chatbot technology and workflow

automation. The system integrates conversational interfaces, backend APIs, and automated workflow orchestration to enable real-time appointment booking, modification, and notification services. Experimental evaluation demonstrates improved response time, reduced scheduling errors, and enhanced operational efficiency compared with traditional appointment management systems.

870. INTELLIGENT PATIENT HEALTH RECORD MANAGEMENT AND EARLY DIAGNOSIS AI SYSTEM

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This research work is relevant to the current digital transformation taking place in the healthcare industry, where many healthcare settings are still struggling with unorganized patient information, inefficient appointment systems, and the absence of an integrated clinical decision support system. To overcome these issues, this paper suggests the development of MedicDiary, an all-inclusive, secure, and AI-based centralized medical application. The application will enable patients to have a single platform to organize their medical history, view medical files, and book appointments with reliable healthcare professionals. At the same time, it will enable healthcare professionals to have a timeline-based consolidated view of a patient's medical status along with their past medical history. In addition, the application will feature a Predictive AI module that employs machine learning algorithms to examine healthcare features and make predictions about the possibility of developing severe diseases, such as cardiovascular diseases. The suggested architectural design includes a Django-based backend that offers high-performance data management and security support, along with a dynamic user interface that can facilitate engaging interactions.

871. DEEP LEARNING BASED EARLY DETECTION AND PROGNOSIS OF RHEUMATOID ARTHRITIS

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Rheumatoid Arthritis (RA) is a chronic autoimmune disorder characterized by progressive joint inflammation, pain, and irreversible structural damage, leading to long-term disability if not detected and managed at an early

stage. Timely diagnosis and accurate prognosis remain challenging due to the heterogeneous nature of the disease and the limitations of conventional clinical and radiological assessment methods. This paper presents a deep learning-based automated framework for the early detection and prognosis of Rheumatoid Arthritis by integrating medical imaging and time-series clinical data. The proposed system employs a Convolutional Neural Network (CNN) to analyze hand MRI and X-ray images for diagnostic classification, categorizing patients into Healthy, Early RA, and Severe RA stages. In parallel, a Recurrent Neural Network with Long Short-Term Memory (RNN-LSTM) architecture is utilized to model disease progression using sequential clinical parameters such as C-reactive protein levels, joint swelling reports, pain frequency, and other longitudinal health indicators. Comprehensive data preprocessing, normalization, and augmentation techniques are applied to enhance model robustness and generalization. Experimental results demonstrate that the CNN model effectively captures discriminative radiographic features for accurate stage-wise RA detection, while the RNN-LSTM model reliably predicts progression trends over time. The system further incorporates an interactive web-based interface with visual analytics, including probability gauges, progression curves, and correlation heatmaps, to support clinical decision-making. The proposed approach advances beyond static diagnosis by offering an interpretable, patient-centric, and scalable solution for early intervention and personalized RA management.

872. INTELLIGENT OF PERSONAL DIGITAL ASSETS: AN AUTOMATED FRAMEWORK FOR LIFECYCLE COMPLIANCE

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The current digital landscape is saturated with critical identification and certification documents, yet the management of their lifecycles remains dangerously not used anymore. This paper introduces a paradigm shift from manual oversight to an intelligent, automated tracking ecosystem. By synthesising Optical Character Recognition (OCR) with robust cloud-native architecture, we eliminate the systemic inefficiencies that lead to missed renewals and legal non-compliance. Our findings validate that a proactive, notification-driven framework not only secures sensitive data but fundamentally empowers the user through an intuitive self-regulating management experience.

873. AUTOMATED BRAIN LESION DETECTION AND QUANTIFICATION USING DEEP BELIEF NETWORKS WITH REINFORCEMENT LEARNING-ENHANCED SEGMENTATION

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Proper segmentation of Multiple Sclerosis (MS) lesions in brain MRI is critical in early diagnosis, treatment planning, and tracking disease progression. Conventional schemes often struggle with heterogeneity in lesions and low tissue contrast, which lead to unreliable detection and measurement. This paper introduces a MATLAB-programmed, cutting-edge segmentation platform that applies Transfer Learning, Deep Belief Networks (DBN), Deep Q-Networks (DQN), Long Short-Term Memory (LSTM), and Large Language Models (LLMs) to address these limitations. Transfer Learning helps in crafting rich features, which are further optimized by DBN in terms

of hierarchical learning, while DQN enhances dynamic detection of lesions at boundaries. LSTM also efficiently extracts inter-slice dependencies in order to maintain structural connectivity. In addition, the system estimates maximum and minimum FLAIR diameters of lesions as quantifiable biomarkers suitable for clinical evaluation. The novelty of this work lies in that deep learning, reinforcement learning, and LLM-driven report generation are holistically applied, hence while providing accurate segmentation, it also offers automated interpretation in the clinical arena. Experimental results show that there is better accuracy, robustness, and clinical value compared to traditional schemes

874.SMART SHIELDS: HYBRID ML AND NLP APPROACH FOR DETECTING EMAIL PHISHING

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Phishing emails still represent a serious cybersecurity risk, incorporating advanced phishing techniques with QR code manipulation (of which most people are completely naïve), URL obscurity or ambiguity, and dynamic content. Traditional detection systems can seldom identify phishing emails as the data sets used by detection systems are often outdated or of limited analysis. As such, a proposal directed at an enhancing phishing detection framework combining machine learning (ML), natural language processing (NLP), and real-time threat intelligence platforms is presented in this research. Using a hybrid model, including the natural language processing feature extraction, anchor URL, and QR code features; sender verification; and dictionary-based authentication the proposed framework was demonstrated to be a hybrid method with superior detection-rate performance and less false positives than detection-rate approaches. Rankings on detection performance coupled with comparisons between the state of the art tools demonstrate advances in the area of performance beyond filtering tools with a more scalable and adaptable capability that can adjust to emerging phishing threats.

875.A STUDY ON THE IMPACT OF EMOTIONAL INTELLIGENCE ON JOB PERFORMANCE AMONG INFORMATION TECHNOLOGY PROFESSIONALS

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The IT sector is described by high work demands, rapid technological change, and continuous performance pressure, making emotional and psychological capacities increasingly relevant to employee functioning. The information technology professionals in Chennai they analyzed the present study of the association between Emotional intelligence (EI) and job performance and further the investigated whether they have resilience ability that to mediates this association. Using a cross-sectional survey design, the multiple IT organizations (N= 380) employees response were collected. Emotional intelligence (EI), resilience, and job performance were examined by using Validated measurement scales. The direct and indirect effects were analyzed by applying the Structural equation modeling. Emotional intelligence (EI) was positively associated with job performance , suggesting that individuals who can perceive, regulate and utilize emotions demonstrate stronger interpersonal effectiveness and task execution was shown in the results. Moreover resilience ability is significantly mediated this relationship by showing that emotional intelligence (EI) employees are more to develop the problem solving ability to reduce stress and maintain performance under demanding conditions. These finding supports to occupational health psychology by highlighting the resilience as key psychological mechanism through which Emotional intelligence (EI) enhance the program functioning in high-pressure environments. The real world application includes incorporating EI and resilience-building interventions into development of employee, well- being programs and leadership practices to support performance sustainability in technology- driven workplaces.

876.AI-VISION BASED SURGICAL INSTRUMENT CLASSIFICATION AND LOCALIZATION

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The increased complexity of surgical procedures and workload on the operating room (OR) personnel highlights the need to automate the processes, particularly the surgical instrument verification. The manual checking process is time-consuming and also error-prone, leading to an increase in the risks of retained surgical instruments (RSIs) and hence compromising the patient's safety. This work presents a comparative analysis of different deep-learning models, including the YOLOv13 [32], SegNet[33], ENet[34], and the Segment Anything Model (SAM[35]). The models are trained and benchmarked using metrics such as the mean Average Precision (mAP), Intersection on Union (IoU), precision, recall, and F1-score. The analysis provides inference and statistical summaries to enhance surgical safety, reduce human error, and improve OR efficiency through practical AI deployment in healthcare.

877.AN EASYOCR BASED MOBILE APPLICATION FOR BUSINESS CARD DIGITIZATION AND MANAGEMENT

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Business cards are still an essential tool used in the process of networking in various fields, including academics, business, and startups. However, dealing with business cards manually can be disorganized, and there is a high possibility of losing data. Although there are many applications used for scanning business cards, most of these applications use simple OCR techniques, which are not efficient in terms of accuracy and organization of the data. This paper proposes a Smart OCR Based Business Card Management System, which mainly employs EasyOCR, along with AI, for extracting data from business cards. EasyOCR is used because of its high accuracy, ability to recognize multiple languages, and capacity to recognize fonts and layouts. It is also based on deep learning, which can be used on mobile platforms. It improves the quality of the captured images, and the data, including name, phone number, email, company, and designation, can be extracted correctly. It stores the data safely, along with features like tagging and reminders. This proposed system can be used as a personal customer relationship management tool, which is efficient, reliable, and can be used by students, freelancers, and business professionals.

878.CONTENT BASED LEGAL RECOMMENDATION TOOL

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the research process in the legal profession. By identifying cases similar in context and content to the user's requirements, it simplifies the retrieval of relevant information. Through contextual insights and arguments, the system enhances the efficiency of legal research. The system employs a metadata-aware retrieval engine combined with a planner-based Retrieval-Augmented Generation (RAG) pipeline that dynamically extracts context from structured JSON case documents. Empirical evaluations demonstrate the tool outperforms standard

BM25 and vector search baselines in retrieval relevance, while its structured RAG component improves the quality of generated legal arguments. The architecture establishes a framework that enables a transition to a highly trustworthy solution for knowledge-intensive professional legal workflows.

879.PREDICTIVE DEVOPS - FORECASTING BUILD AND DEPLOYMENT FAILURES

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This project suggests an AI-based test automation framework that generates, prioritizes, and optimizes test cases intelligently for CI/CD pipelines. It utilizes machine learning and natural language processing abilities to figure out code changes, user stories, and previous defects, and to generate context-based tests with minimal code inserted and maximum coverage. It smartly evaluates the risk of the changes and applies this to prioritize to order tests to run with rapid feedback and early defect detection. In order to facilitate smooth integration into a DevOps toolchain, there is a self-improving feedback loop built into the platform that constantly optimizes the accuracy of the tests generated against execution history. Implementation of the automation platform will enhance software quality delivered, enhance primary release cycles, and enhance overall reliability during development.

880.BLINKCRYPT :AES - SECURED MORSE COMMUNICATION WITH SOS TRIGGER SYSTEM

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Communication barriers significantly affect individuals with severe motor and speech impairments, limiting their ability to express basic needs and respond during emergencies. To address this challenge, this paper presents BLINKCRYPT, a secure and non-invasive assistive communication system that enables users to convey messages through intentional eye blinks. The proposed system captures real-time video using a standard camera and analyzes blink patterns using the Eye Aspect Ratio (EAR) algorithm to distinguish between short and long blinks, which are mapped to Morse code symbols. The decoded text is then encrypted using the Advanced Encryption Standard (AES) to ensure secure and confidential communication. In addition, an integrated SOS detection mechanism continuously monitors blink patterns and automatically triggers emergency alerts when predefined distress signals are identified. By combining computer vision, Morse-based interaction, encryption, and emergency response in a single framework, BLINKCRYPT offers a low-cost, reliable, and accessible solution that enhances communication independence, safety, and privacy for individuals with physical disabilities. Keywords—Eye Aspect Ratio, Blink-Based Communication, MorseCode Translation, Computer Vision, AES Cryptography, Emergency Alert System, Assistive Technology.

881.COMPARATIVE ANALYSIS OF MACHINE LEARNING AND DEEP LEARNING APPROACHES FOR MRI-BASED BRAIN TUMOR DETECTION

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Early and accurate diagnosis of brain tumors is extremely important to timely treatment planning and patient prognosis. The paper is a comparative analysis of the two methods in the detection and classification of brain tumors from MRI images: machine learning (ML) and deep learning (DL). Integrating the existing methods of ML, i.e., Support Vector Machines, Random Forests, Bayesian classifiers, and feature merging techniques, with contemporary DL models, such as Convolutional Neural Networks (CNNs), UNet-based segmentation, attention-weighted models, and hybrid quantum-assisted networks. ML models operate based on manually learned features, such as intensity, texture, shape, and ADC-based features, which are interpretable and can be

utilized with small datasets or heterogeneous datasets. On the contrary, DL approaches learn hierarchical features automatically from raw MRI data, leading to increased precision, sensitivity, and specificity across different datasets. The paper critically evaluates the performance measures of several recent works and demonstrates that the DL is always better than the ML in terms of tumor localization, accuracy in classification, and insensitivity to different imaging parameters. Furthermore, the ensemble of transfer learning, explainable AI, and ensemble methods will enhance DL pipelines' clinical interpretability and scalability. Overall, our findings uncover the sheer effectiveness of DL models and do not deny the additional value of ML within structured feature analysis. It is on this comparative investigation that the application of the DL-based MRI analysis as a computerized, clinically applicable, and reliable tool in the realm of individualized neuro-oncological diagnostics is possible.

882.REAL-TIME ANIMAL DETECTION ON RAILWAY TRACKS USING YOLO

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Accidents on the railroad caused by animals are a major safety risk to consider, and will frequently result in loss of lives as well as damage to property, disruption of train schedules, etc. This project describes a real-time animal detection system (for railway tracks) using deep learning, computer vision, and Internet of Things (IoT) Technology. The system connects live video feeds from multiple cameras to a NodeMCU (ESP8266), then processes the video frames with OpenCV in Python through the use of pre-trained models such as YOLO or Haar cascades to identify when an animal has crossed onto the railway track. Upon detection of an animal crossing the tracks, the system will immediately sound an alarm and display the alert on a liquid crystal display (LCD). In addition to sounding an alert and displaying the information, the system will also simulate the reduction in train speed using a direct current (DC) motor. Using IoT cloud platforms like Blynk or ThingSpeak,

we can monitor animal detections from anywhere and receive notifications of a detected event, allowing prompt intervention. The proposed system is designed to improve the safety of railroads by preventing train-animal collisions, as well as create a scalable solution that can be applied to other forms of transportation, including highways, and to demonstrate an example of how AI can effectively integrate with IoT and real-time control systems.

883.GEOSPATIAL QUERYING SYSTEM

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“Geospatial Querying System” introduces is an advanced solution designed to extract and process location-based information from unstructured text using Natural Language Processing (NLP) and geolocation techniques. The system operates through three primary modules: Named Entity Recognition (NER), Geolocation, and Text Processing & Integration. The NER module utilizes spaCy's pre-trained model to identify Geo-Political Entities (GPEs), such as cities, countries, and regions, from textual input. The Geolocation module then maps these extracted locations to precise latitude and longitude coordinates using the Geopy library and the Nominatim API, which is based on OpenStreetMap data. The Text Processing module integrates these components, ensuring accurate location extraction and resolving ambiguities when multiple places share the same name. The system enhances geospatial querying capabilities, making it valuable for applications in information retrieval, geospatial analysis, and data mining. Future enhancements include machine learning-based disambiguation techniques, interactive mapping and visualization tools, and integration with big data systems for real-time geospatial processing. By providing accurate geolocation insights, this system plays a crucial role in applications such as geospatial intelligence, urban planning, disaster response, and social media analytics.

884.VEHICLE TO GRID AND GRID TO VEHICLE IN MICROGRID

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This study presents a simulation-based approach for analyzing Vehicle-to-Grid (V2G) and Grid-to-Vehicle (G2V) operations within a microgrid framework using Python on Google Colab. The model replicates bidirectional power flow between electric vehicles and the grid through a combination of a lithium-ion battery subsystem, bidirectional DC–DC and DC–AC converters, and control logic for state-of-charge (SOC) monitoring and energy flow management. The simulation demon- strates stable DC-bus voltage regulation

around 1.5 kV, efficient inverter current tracking, and low total harmonic distortion of grid current at approximately 2.3%. The findings confirm that the proposed V2G–G2V control architecture can enhance grid reliability, support renewable energy integration, and provide a cost-effective platform for sustainable energy management using electric vehicles as distributed energy storage units.

885.ECG-BASED CLASSIFICATION OF TYPES OF DEPRESSIVE DISORDER USING CONVOLUTIONAL NEURAL NETWORKS: A DEEP LEARNING STUDY

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The Deep Learning based Depression Detection System is a healthcare solution through which depression is detected by ECG signals and the specific depression type is determined by analyzing these non-invasive signals. Original ECG data from MAT files is transformed into images which can be processed by deep learning algorithms through its advanced preprocessing techniques. InceptionV3 convolutional neural network is used as the backbone of the framework to extract complex spatial and temporal features from ECG patterns which enable depression disorders to be classified. Explainable AI methods which include Gradient-weighted Class Activation Mapping (Grad-CAM) are used by the system to show which parts of ECG signals lead to the most significant model prediction results. The diagnostic process is operated with complete transparency. Immediate automated depression detection is achieved by the system through its focus on scalability and accessibility. This makes it suitable for early screening purposes. The solution is operated as a lightweight system which can be deployed in healthcare applications, telemedicine platforms, and wearable devices to provide clinical support and mental health monitoring for patients.

886.EXPLAINABLE MULTIMODAL ANEMIA PREDICTION USING DEEP LEARNING ON VISUAL SYMPTOM INPUTS

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About 57% of women and 67% of children in India suffer from anemia, which is still a serious public health issue. Its diagnosis is still mostly dependent on expensive and invasive hematological testing, though, which restricts access in places with limited resources. This study introduces a non-invasive, explainable AI-based framework for predicting anemia that combines survey data based on symptoms with multimodal inputs such as pictures of the eye, palm, tongue, and nails. Multi-Layer Perceptrons (MLPs) process symptom features, while Convolutional Neural Networks (CNNs) extract visual features. The Random Forest, Logistic Regression, and Support Vector Machine (SVM) algorithms are used to fuse and classify both representations. SHapley Additive exPlanations (SHAP) highlight important symptom attributes, and Gradient-weighted Class Activation Mapping (Grad-CAM) visualizes important image regions to improve interpretability. With an accuracy of 94.2%, precision of 92.8%, recall of 93.6%, and an F1-score of 93.1%, the Random Forest classifier outperforms unimodal approaches by more than 7%, according to experimental results. By making model decisions transparent, the explainability components increase clinical acceptance and user trust. In rural and resource-constrained healthcare settings, the suggested framework shows great promise for accessible, interpretable, and reasonably priced anemia screening, which would promote early diagnosis and better public health outcome.

887.AI-BASED ADAPTIVE ONTOLOGY FRAMEWORK FOR AUTONOMOUS EXTRACTION AND PURCHASE ORDER PROCESSING FROM UNSTRUCTURED EMAILS

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Recent developments with large language models (LLM's), as well as retrieval augmented generation (RAG) technologies have enabled to develop intelligent document process systems with the capability to extract structured information from unstructured enterprise documents. RAG technology has an inherent limitation when applied to unstructured email-based purchase orders; vector similarity retrieval captures semantic similarity, but cannot maintain or reason about structured business knowledge—customer specific product names, time ordered patterns, and prior conversation history—that are required to accurately extract field level information. This paper presents an adaptive AI framework that addresses the context loss problem through four key innovations: (1) a procurement-specific knowledge graph ontology encoding customer-product relationships, alias mappings, and co-purchase patterns; (2) a confidence-gated adaptive feedback mechanism that evolves the ontology with each processed order while preventing error propagation; (3) a seven-stage multi-agent pipeline with specialized agents sharing typed state; and (4) a hierarchical customer memory layer enabling O(1) context retrieval for repeat customers. Ablation studies on 30 curated test scenarios demonstrate the contribution of each component: baseline LLM extraction achieves 63.2% F1-score ($\pm 16.8\%$, 95% CI), RAG-only retrieval improves this to 76.7% ($\pm 13.8\%$), knowledge graph context alone achieves 94.3% ($\pm 7.3\%$), and the combined KG+RAG system achieves 97.8% ($\pm 3.0\%$) with 100% customer identification accuracy. More critically, the knowledge graph contributes more than RAG (+49% vs +21% improvement over baseline), validating the significance of structured procurement intelligence over semantic similarity.

888.NEUROLOGICAL DISORDER CLASSIFICATION

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Multiple sclerosis, brain tumors, and Alzheimer brain diseases are considered to be complicated to detect because of the complex structure and variations that exist in the brain MRI images. In this paper, an Artificial Intelligence based neurological disorder classification system is presented, which is an attempt to classify brain MRI scans into various classes of disorders using deep learning methods on an automatic basis. The convolutional neural network with the RexNet-150 architecture to be used in the proposed model is trained on a labeled MRI dataset that includes eight categories (Normal, Multiple Sclerosis (MS), Alzheimer's disease (Very Mild, Mild, and Moderate Demented), and various types of brain tumors: Glioma, Pituitary, and Meningioma). Prior to training, normalization and resizing of the MRI images are done to ensure that there is consistency in the input size and better learning. The dataset will be separated into training, validation, and testing to increase the generalization capability of the model. The network is trained by Adam optimizer and the loss is Cross-Entropy as it is essential to achieve accurate classification outcomes and the performance metrics are measured with the help of accuracy and F1- score. The trained model is deployed and specified as an interactive web application based on the Streamlit framework, in which the user can upload MRI images in JPG, PNG, and BMP format. The application also offers predictions in real-time and confidence scores and visualizations that allow a deeper interpretation of the outcomes. The experimental findings prove that the given system can provide high classification accuracy, and the performance rates are regularly above 98 per cent in the majority of classes. This smart diagnostic support tool shows that deep learning methods are effective at helping in the early detection and classification of neurological diseases, which could be used to deliver better medical decision-making and health care outcomes.

889.A UNIFIED INTERACTIVE FRAMEWORK FOR METRIC-AWARE COUNTERFACTUAL SENSITIVITY ANALYSIS AND BIAS – RESPONSIVE OPTIMIZATION IN MODEL – AGNOSTIC MACHINE LEARNING SYSTEMS

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The widespread deployment of machine learning systems in high-stakes domains such as finance, healthcare, and criminal justice has intensified concerns regarding algorithmic bias and fairness violations. Existing fairness toolkits provide metric computation and mitigation algorithms; however, they often lack an integrated, automated, and user-driven orchestration layer capable of mapping detected fairness violations to appropriate mitigation strategies. In this paper, we propose a unified end-to-end AI Safety and Bias Evaluation System that performs model-agnostic fairness auditing, automated sensitive attribute analysis, metric-aware mitigation recommendation, and comparative bias visualization. The system allows users to upload datasets and trained models, perform performance diagnostics, compute fairness metrics using custom statistical implementations, and apply targeted mitigation strategies through controlled integration of Microsoft Fairlearn and IBM AIF360 frameworks. A novel metric-driven mitigation mapping engine is introduced to automatically select corrective strategies based on detected fairness violations. Experimental evaluation on benchmark classification datasets demonstrates significant bias reduction with minimal accuracy degradation. The proposed framework contributes a deployment-ready fairness orchestration architecture for trustworthy AI systems.

890.STOCK MARKET PREDICTOR USING AI

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The problem of predicting stock-market dynamics is of critical significance and a highly complicated concern in the field of financial engineering, in the first place, due to the nonlinearity, noise and non-stationarity of financial time series. Older econometric models (ARIMA, GARCH, etc.) have a natural weakness in their ability to explain long-term, multivariate dependencies inherent to market patterns. In this paper, the authors suggest an effective financial forecasting model that is based on the Bidirectional Long Short-Term Memory (Bi-LSTM) neural-network structure. The system uses the bi-directional processing of the Bi- LSTM to correctly analyze historical data sequences e.g. a 60-day window in both directions (forward future, backward past) to provide a more nuanced contextual representation of complex market patterns. We use a large number of features such as Open- High-Low-Volume (OHLCV) data with its add-on technical indicators like RSI and MACD. The raw data is subjected to strict Min-Max scaling and sequence transformation to give a good model training. To evaluate the efficacy of the models, temporal-series performance measures, especially the Root Mean Squared Error (RMSE) and directional prediction accuracy are employed. As our empirical findings have shown, the Bi-LSTM model has been proved to have higher performance and lower predictive error than the traditional Unidirectional LSTM and the basic econometric models, which reveal its consistency and applicability to high-stakes algorithmic trading and financial risk assessment.

891. COMPUTATIONAL INTELLIGENCE APPROACHES FOR METAPHOR DETECTION IN LOW-RESOURCE LANGUAGES: A SYSTEMATIC SURVEY WITH FOCUS ON MALAYALAM

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Detecting metaphors within natural language processing is notoriously difficult due to their need for interpretation from various perspectives including context, culture, and cognition in addition to their literal meanings. Machine learning and transformer models have made much advancement to metaphor detection with

high resource languages, however, metaphor processing for low resource or morphologically rich languages remains largely untouched. Here we present a systematic survey of computational intelligence methods that relate to metaphor detection; namely, rule-based, corpus-based, hybrid models, transformer-based models, and large language models. Special attention is given to Malayalam as an example of an agglutinative Indian language highlighting the limitations of both data driven and morphology agnostic methods for metaphor detection. From our evaluation of the literature concerning metaphor detection, we provide evidence for major research gaps such as the lack of benchmark datasets, the lack of morphology awareness in existing models, weak cross-lingual transferability for figurative meaning across languages, low explainability, and high computational costs. Ultimately, our findings suggest that detection of metaphors provides a valid test case for building robust yet resource-efficient computational intelligence models for low resource languages.

892.LUNG CANCER CLASSIFICATION USING CT SCAN IMAGES AND U-NET BASED DEEP SEGMENTATION FRAMEWORK

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Lung cancer is a major contributor to cancer deaths across the globe, and this is largely because it is diagnosed too late. This study proposes an automatic framework that incorporates both image analysis and clinical data attributes for the purpose of early and accurate detection of lung cancer. This is achieved by a two-stage framework that consists of a CNN-based encoder-decoder network that segments lung regions and nodules, followed by CNN-based classification models that distinguish between benign and malignant nodules. In addition to image attributes, clinical data attributes are incorporated to increase reliability. Experiments indicate that incorporating clinical attributes into ROI imaging features improves diagnostic performance and minimizes false negatives compared to image attributes alone. The framework has high accuracy and consistency across different cases. The study indicates that incorporating both clinical and imaging attributes provides a reliable and efficient decision-support tool for the early and accurate detection of lung cancer.

893.THE ALGORITHMIC COMPASS: NAVIGATING THE INTERSECTION OF AI- DRIVEN CSR AND PREDICTIVE MARKETING IN THE AGE OF SUSTAINABILITY

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The integration of predictive analytic's and Corporate Social Responsibility has triggered a paradigm shift in the way companies respond to sustainability. It's No longer limited to conventional corporate philanthropy and companies are leveraging Large Language Models and synthetic consumers to predict stakeholder demand's and automate social responsibility initiative's. This current paper examines the Generative Shift in CSR where predictive marketing software like previously and exclusively used for sales is now being reconfigured to

engineer authenticity for brand's. By integrating the framework of digital twin's and psychometric modeling that this research reveals the Predictive Purpose paradigm and where data analytics anticipate's social trends but may also be subject to the erasure of human sentiment through algorithmic convergence. This examination concludes with a Human in the Loop framework to ensure the ethical and valid alignment of the digital paradigm shift in CSR.

894.AUTHENTICITY IN THE AGE OF SIMULATION: EVALUATING THE VALIDITY AND ETHICS OF AI-GENERATED "SYNTHETIC CONSUMERS" IN MARKET RESEARCH

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The convergence of Large Language Models and the psychometric profiling has fundamentally reshaped the very market research and moving it from the very observation of the real human behavior to the generation of much of synthetic consumer's that this paper presents an extensive analysis of exploring how AI technologies which specifically Natural Language Processing and Generative AI are then being used to simulate the consumer responses and the persona's and the focus group's. By synthesizing the insights from over 150 contemporary texts and the paper identifies three primary shifts in which like the evolution of the exhaust data into the digital twin's and the replacement of the traditional survey panel's also with high velocity algorithmic simulations like follow's and the emergence of the synthetic empathy as a tool for the product testing. The analysis also highlights a critical tension between the very cost efficiency of the simulation and the inherent necessity of the human authenticity. While the synthetic consumer's also offer unprecedented scale and they introduce the significant risks regarding the hallucinated market insights and the reinforcement of the algorithmic bias and the marginalized voices like This paper concludes that the very future of research lies in a hybrid Human like in the Loop framework and where synthetic agents provide a very rapid prototyping but the human subjects ensure that the ethical resonance and the real world validity of the findings.

895.AUTOHIRE: AN AGENTIC AI-BASED INTELLIGENT JOB ASSISTANT FOR RESUME-DRIVEN JOB MATCHING AND INTERVIEW PREPARATION

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The increasing digitalization of job platforms has led to an increase in the availability of job opportunities and the complexity of the recruitment process. Job seekers are usually flooded with non-relevant job suggestions, and it becomes difficult for recruiters to properly assess a large number of applications. This paper introduces AutoHire, an Agentic AI- powered intelligent job assistant system. The proposed system uses a multi-agent artificial intelligence framework, where separate agents work independently on resume parsing, real- time job extraction, resume-job matching, cover letter writing, interview preparation, mock interviews, skill gap analysis, and learning recommendations. By the power of Large Language Models (LLMs) and live job APIs, AutoHire offers interpretable job recommendations, match scores, and feedback. Experiments show that the system is effective in improving job relevance, interview preparedness, and the availability of a scalable, transparent, and user-friendly recruitment solution.

896.ANTI-JAMMING MECHANISM FOR HIGH-VALUE TRANSPORTATION SYSTEMS

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Real-time vehicle and asset tracking systems rely on Global Navigation Satellite Systems (GNSS) and cellular communication for positioning and data transmission. However, they are vulnerable to jamming attacks, signal

loss, and disruptions in areas with poor coverage. This paper presents a complete IoT-based Anti-Jamming Vehicle Tracking System that combines GNSS with a 6-DOF MPU-9250 inertial measurement unit (IMU) using Kalman filtering for accurate position estimation and continuity. It includes a fallback to dead reckoning using IMU accelerometers and gyroscopes when GNSS is jammed. The system features route-aware tracking with Open-Source Routing Machine (OSRM) to snap paths to real road networks and remove impossible routes. It also employs edge-based jamming detection using machine learning algorithms (Random Forest, SVM) on Raspberry Pi 4, which analyzes GNSS and LTE patterns in real time. Multi-modal communication prioritizes LTE through SIM7600 before switching to 3G (GSM) and offline buffering. The system provides real-time alerts for signal loss, speed violations, low battery, and jamming events via email, browser push notifications, and a Django REST API cloud dashboard for monitoring fleets, audit trails, and visualization. The hardware includes a u-blox M9N GNSS receiver, an ESP32 microcontroller, and a Raspberry Pi 4 for cost-effective commercial off-the-shelf deployment without specialized military components. Experimental validation in controlled jamming scenarios—constant, random, deceptive, and reactive. The reliable route playback makes it suitable for logistics, fleet management, high-value asset protection, emergency response, and critical infrastructure monitoring. This work presents a scalable, unified solution for robust real-time tracking in challenging environments.

897.SMART CHEQUE VERIFICATION SYSTEM

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In banking settings, cheques are still in use for payment transactions, but physically filling and verifying cheques can lead to discrepancies and fraud. Inaccurately filled information, amount discrepancies, and forged signatures are still causing cheques to bounce and delays in the processing. This paper presents a smart and automated system for checking cheques that intends to assist individuals in filling the given cheques as well as in checking the deposited cheques in an efficient manner. The proposed system utilizes Optical Character Recognition (OCR) to read the critical information in the cheque, such as the name of the payee, date, and amount, from the scanned image of the cheque. The image processing techniques are utilized to analyse the extracted information, and the signature verification technique, which relies on machine learning, is utilized to verify the signature by comparing the signature in the cheque with the sample signature stored in the system. The system also checks the consistency of the amount in words and the amount in numbers to detect any irregularities in the deposited cheque. The proposed system minimizes the need for manual verification, thereby maximizes the efficiency of the time taken to perform the task, and maximizes the accuracy of the task. The proposed system is flexible enough to be utilized in the real world because of the modular design of the system.

898. A MULTI-STAGE SAFETY-ALIGNED LEGAL ADVISORY FRAMEWORK USING HYBRID NLP AND RULE-BASED REASONING

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Availability pertaining to sound legal advice is a domain where many people do not have access, and in most cases, a lack of information leads to procedural errors, delays, and unnecessary disputes. Traditional online legal aid systems rely largely on predefined templates or search algorithms, which in turn hinder their capability to deduce a safe and contextually relevant response based on user intent. To overcome this problem, an automated legal aid system based on safety filtering, domain classification, natural language inference, logical rules, and search-driven generation, which can output preprocessed preliminary recommendations in a structured format, is proposed. The proposed system mainly targets case analysis based on common query inputs to discern a relevant case type and corresponding role of the submitter, including all vital steps and necessary documents based on a multi-step hybrid processing task. The proposed system comprises a safety filter module, which trains a classifier to detect malicious or illegal intent, a LegalBERT classifier classifies case domains based on domains and roles, and an NLI credibility checker to identify infringing statements and deficiencies in statements using an NLI credibility checker. To improve this, a statement clarification module will be used to allow a request for additional information, which is further preprocessed in a central rules engine with predefined procedural models in civil, criminal, and other domains. In case of a problem requiring multiple possible solutions with respect to a problem, a workflow predictor will model all procedural paths. A search-driven generator will further assist in refining responses with relevant statute citations and other related case laws. The system can be developed in an application interaction interface through which users can load statements and need assistance in a preprocessed format detailing procedural requirements, important documents, case rights, and other professional assistance. Being modular, safe, and accurate in nature, this system will benefit commoners in need of accessible and safe preprocessed online advice.

899.DRIVE - DATA RECORDER AND INTELLIGENT VEHICLE EVALUATOR

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The safety of road transportation has a high demand on reliable sources of evidence to conduct accurate investigations of accidents, assess liability, and diagnose the operation. The study article presents a car event record system that is a composite of vehicle simulation in real time, embedded processing unit, and driver-vehicle interaction tracking. A Webots-based digital twin vehicle simulator allows the simulation of realistic driving conditions by allowing the use of a gaming controller with buttons to control steering, acceleration, braking, and clutch engagement, as well as gear selection. The data regarding driver intent measured with the help of CAN-enabled potentiometer interfaces is processed with the help of Raspberry Pi 4, and the data about vehicle activity parameters such as velocity change, wheel dynamics, transmission state, and visual feedbacks are taken out of simulation results. Correlation-based verification system involves a continuous comparison of driver commands and vehicle response measurements to detect anomalies, identify faults, and evaluate behaviour. Circular buffering with time-stamped storage is event-centric, which helps to preserve the vital context of operations to be used after incidents. Experimental assessment shows the suggested model detection precision of up to 95%, and output recording framework illustrates steady working performance of about 96% accuracy on controlled validation circumstances. Digital twin-guided arrangement offers low-cost scalability capacity in support of transportation safety analytics, underwriting evaluation protocols, and legal examination necessities within advanced automotive tracking settings.

900.MEDILOCK: BLOCKCHAIN SMART CONTRACT SOLUTION FOR HEALTHCARE PRIVACY

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The rapid digital transformations driven by electronic health records, telemedicine, and data-driven clinical decision-making have been occurring within the healthcare industry. However, conventional hospital-centric storage systems and centralized cloud infrastructures have proven to be highly vulnerable to cyberattacks, unauthorized access, insider threats, and data tampering—they only give a minimal amount of control to a patient in respect to their sensitive health information. This paper presents MediLock, a secure, blockchain-based architecture that is patient-centric, for healthcare data management. MediLock integrates solutions on confidentiality and integrity using decentralized storage, cryptographic protection, and fine-grained access control. ChaCha20 is the symmetric crypto scheme adopted for the efficient, high-performance encryption of medical data at rest. This accommodates large and diverse healthcare files. A hybrid cryptographic scheme, using RSA and AES, was adopted for secure data transmission and key management; RSA is used for safe key exchange, while AES offers fast bulk data encryption. Moreover, ABE allows access control and fine-grained data retrieval, allowing only strict access to medical record under pre-established attributes of user role and authorization level as well as clinical context. Smart contracts within blockchain can automatically remind to enforce consent management and authorization policies, which guarantee that all access requests, grants, revocations, or emergencies overrides are stored on-chain with integrity. The article also expands the scheme as decentralized encrypted storage by using IPFS/Arweave and proxy re-encryption so that key sharing can be distributed among the parties who have authorization in a safe manner. Flask based web-based application provides role based dashboard, uploading of files encryptedly, and audit tracking. Massive test execution shows high levels of latency in smart contract execution, efficient use of conditional access, and scalability in patients-physician interactions. MediLock fills the knowledge gap between the theoretical blockchain security paradigm and practical healthcare usability, thereby providing a practical, secure and scalable solution to digital hospitals, telehealth architecture, and federated clinical ecosystems.

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171	MAHATMA GANDHI MISSION'S COLLEGE OF ENGINEERING, NANDED
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176	MARATHWADA MITRA MANDAL'S COLLEGE OF ENGINEERING, PUNE
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178	MATOSHRI COLLEGE OF ENGINEERING AND RESEARCH CENTRE, NASHIK
179	MEENAKSHI SUNDARARAJAN ENGINEERING COLLEGE, CHENNAI
180	MEPCO SCHLENK ENGINEERING COLLEGE, SIVAKASI
181	MET BHUJBAL KNOWLEDGE CITY, NASHIK
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184	MIT ACADEMY OF ENGINEERING, PUNE
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186	MOHAN BABU UNIVERSITY, TIRUPATI
187	MOTHER THERESA INSTITUTE OF ENGINEERING AND TECHNOLOGY, AP
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195	NEW PRINCE SHRI BHAVANI COLLEGE OF ENGINEERING AND TECHNOLOGY, CHENNAI
196	NGM COLLEGE, POLLACHI
197	NIT, DELHI
198	NIT, GOA
199	NITTE (DEEMED TO BE UNIVERSITY), NMAM INSTITUTE OF TECHNOLOGY, KARKALA

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204	ORIENTAL COLLEGE OF TECHNOLOGY, BHOPAL
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208	PAAVAI ENGINEERING COLLEGE, NAMAKKAL
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214	PERIYAR MANIAMMAI INSTITUTE OF SCIENCE AND TECHNOLOGY, THANJAVUR
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224	PRESIDENCY UNIVERSITY, BENGALURU
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229	PSNA COLLEGE OF ENGINEERING AND TECHNOLOGY, TIRUNELVELI
230	PUNE VIDYARTHI GRIHA'S COLLEGE OF ENGINEERING & TECHNOLOGY AND MANAGEMENT, PUNE
231	PUNJABI UNIVERSITY, PATIALA
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242	RAJAGIRI SCHOOL OF ENGINEERING AND TECHNOLOGY, KOCHI
243	RAJALAKSHMI ENGINEERING COLLEGE, CHENNAI
244	RAJALAKSHMI INSTITUTE OF TECHNOLOGY, CHENNAI
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246	RAJARAMBAPU INSTITUTE OF TECHNOLOGY, RAJARAMNAGAR
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260	ROBOLOG AUTOMATION, DHARMAPURI
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273	SANT GADGE BABA UNIVERSITY, AMRAVATI
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275	SASTRA DEEMED UNIVERSITY, THANJAVUR
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279	SAVEETHA UNIVERSITY, CHENNAI
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283	SCOE, PUNE
284	SCSVMV, KANCHEEPURAM
285	SDM INSTITUTE OF TECHNOLOGY, UJIRE
286	SDNB VAISHNAV COLLEGE FOR WOMEN, CHENNAI
287	SENGUNTHAR ENGINEERING COLLEGE, ERODE
288	SESHADRI RAO GUDLAVALLERU ENGINEERING COLLEGE, GUDLAVALLERU
289	SGGSIE&T, NANDED
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292	SHRI JYT UNIVERSITY, JHUNJHUNU, RAJASTHAN
293	SHRI VAISHNAV INSTITUTE OF INFORMATION TECHNOLOGY, SHRI VAISHNAV VIDYAPEETH VISHWAVIDYALAYA, INDORE
294	SHRI VISHNU ENGINEERING COLLEGE FOR WOMEN, AP
295	SHRIDEVI INSTITUTE OF ENGINEERING AND TECHNOLOGY, TUMKUR
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297	SIDDHARTH INSTITUTE OF ENGINEERING AND TECHNOLOGY, CHITTOOR, AP
298	SIDDHARTHA ACADEMY OF HIGHER EDUCATION, TUMAKURU
299	SIDDHARTHA ACADEMY OF HIGHER EDUCATION, VIJAYAWADA
300	SIMATS ENGINEERING, CHENNAI

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303	SJC INSTITUTE OF TECHNOLOGY, KARNATAKA
304	SJM INSTITUTE OF TECHNOLOGY, CHITRADURGA
305	SKCET, COIMBATORE
306	SNDB VAISHNAV COLLEGE FOR WOMEN, CHENNAI
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308	SREE SOWDAMBIKA COLLEGE OF ENGINEERING, VIRUDHUNAGAR
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398	VISVESVARAYA NATIONAL INSTITUTE OF TECHNOLOGY, PUNE
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400	VIT, CHENNAI
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