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ADHIPARASAKTHI ENGINEERING COLLEGE

MELMARUVATHUR - 603319

Department of Computer Science and Engineering

Organizing

International Conference on Mathematics, Computing, and Artificial Intelligence for Management Innovation

(ICMCAIMI-2025)

16th & 17th April, 2025

PROCEEDINGS

International Conference on Mathematics, Computing, and Artificial Intelligence for Management Innovation (ICMCAIMI-2025)

16th & 17th April 2025

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International Conference on Mathematics, Computing, and Artificial Intelligence for Management Innovation (ICMCAIMI-2025)

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PREDICTIVE ANALYSIS OF CHRONIC KIDNEY DISEASE USING MACHINE LEARNING

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ABSTRACT

Chronic kidney disease (CKD) prediction using machine learning aims to enhance early detection and intervention for better patient outcomes. The process begins by collecting data from a relevant dataset, followed by data cleaning to handle missing, incorrect, or inconsistent values. The data is preprocessed to ensure it is in a suitable format for machine learning models. Once the data is cleaned and preprocessed, a machine learning model is trained on the dataset to identify patterns and predict CKD risk. The model is then evaluated, and decisions are made based on whether the predictions align with the actual outcomes. Finally, predictions for individual patients are made using this trained model, which can be visualized through a Flask-based web application. Users can log in to the website, input their data, and receive personalized recommendations on whether they should consult a doctor based on the predictions made by the machine learning model. The system continuously learns and adapts to new data, improving its accuracy over time. This application aims to provide a user-friendly interface for healthcare providers and patients to act proactively regarding kidney health. The integration of machine learning and web technologies creates a comprehensive tool to aid in the early detection and management of CKD.

MACHINE LEARNING - BASED CELLULAR TRAFFIC PREDICTION USING DATA REDUCTION TECHNIQUES

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ABSTRACT

This study proposes a machine learning-based approach for accurate cellular traffic prediction, aiming to optimize network resources and improve communication efficiency. The system uses MATLAB for data preprocessing and analysis, dimensionality reduction methods like Principal Component Analysis and Autoencoders, and YOLOv8 for real-time anomaly detection. The predictive model is trained using historical cellular traffic data and advanced regression and deep learning algorithms. Experimental results show improved prediction accuracy, reduced processing time, and enhanced network adaptability, supporting efficient resource allocation and proactive network management in dynamic cellular environments.

DEEPFAKE VIDEO DETECTION USING DEEP LEARNING

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ABSTRACT

This paper demonstrates a new technique for detecting deep fake videos using deep learning approaches. Our technique uses the MobileNetV2 architecture as a base model, which we augmented with additional convolutional and fully connected layers to classify videos based on whether they contain genuine or tampered faces effectively. Our solution combines face detection, feature extraction, and binary classification to detect tampering in media. The results show our approach is effective because it attained competitive detection accuracy while remaining efficient in computation for operational use. The implementation enables real-time deepfake detection, visibly marking the frames containing faces with “genuine” or “fake”, thereby providing aid in addressing the challenge posed by synthetic media.

KEYWORDS

MobileNetV2, Deepfake Detection, Real, Fake, Deep Learning.

HORROR GAME WITH ADAPTIVE AI USING UNREAL ENGINE

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ABSTRACT

Horror Game with Adaptive AI using Unreal Engine Abstract This survival horror game features an intelligent AI that learns from the player's actions, creating a dynamic and terrifying experience. The AI enemy adapts its behavior based on how the player reacts—hiding, running, or fighting back— forcing players to constantly change strategies. The game includes immersive sound design, procedural scares, and an unpredictable environment to enhance tension. As the story unfolds, players must uncover hidden clues, solve puzzles, and survive increasingly intense encounters. The project focuses on AI-driven gameplay, procedural horror mechanics, and psychological elements to create an engaging and terrifying experience for players.

VEHICLE COUNT SYSTEM AND TRAFFIC MANAGEMENT

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ABSTRACT

Urban traffic congestion remains a persistent challenge worldwide, necessitating innovative solutions to optimize vehicular flow and enhance road safety. This research introduces a comprehensive framework leveraging machine learning algorithms, specifically YOLOv8, to address key facets of traffic management, including vehicle detection, counting, and intelligent traffic signal control. At the core of the proposed system is real-time video analysis, enabling precise identification and tracking of vehicles within monitored areas. By harnessing the capabilities of YOLOv8, the system achieves high accuracy in vehicle detection, even in complex urban environments with varying lighting conditions and occlusions. The detected vehicles are subsequently counted, providing essential data for traffic flow analysis and management. To facilitate efficient traffic flow, the system employs machine learning techniques to analyze vehicle distributions across lanes and intersections. By dynamically adjusting traffic signal timings based on real-time vehicle counts, the system optimizes traffic flow, minimizing delays and congestion. A key innovation lies in the adaptive control mechanism, which prioritizes lanes with higher vehicle densities by turning traffic lights green, while redirecting traffic from less congested lanes with red signals. Furthermore, the system integrates a lane detection technique to identify the end lanes of roads and detect vehicles parked outside designated spaces. This feature serves to mitigate congestion caused by illegally parked vehicles, a common issue in urban areas. Upon detecting a vehicle parked on the road, the system initiates an alert, prompting swift action to relocate the vehicle and restore smooth traffic flow. The effectiveness of the proposed framework is demonstrated through extensive experimental evaluations conducted in simulated urban environments.

FOOD LINK : EXCESS FOOD COLLECTION AND DISTRIBUTION PORTAL

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ABSTRACT

Food waste is a serious global problem that has significant environmental, economical, and social consequences. Many measures to decrease food waste have been proposed in recent years, including the creation of leftover food management systems .This website is designed for an NGO committed to reducing food wastage and promoting sustainability. The platform serves as a bridge between food providers—such as hotels, restaurants, catering services, event organizers, party halls, and more—and beneficiaries like orphanages and organic waste recyclers. The primary objective is to collect excess or surplus food from various sources and ensure it is redirected to those in need or to facilities that can repurpose it into organic products such as compost or fertilizers. By streamlining the donation and collection process through an efficient and user-friendly interface, the website empowers food donors to contribute effortlessly, while also enabling timely and hygienic distribution by the NGO team. This initiative not only addresses hunger by supporting orphanages with edible surplus food but also supports environmental sustainability by preventing food from ending up in landfills and turning organic waste into useful by-products.

KEYWORDS

Food management, Food Donor, Food Wastes, Food Distribution

AI-POWERED JEE CHATBOT: A RAG-BASED ASSISTANT FOR SUBJECT - SPECIFIC DOUBT SOLVING

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ABSTRACT

This project aims to develop an AI-powered chatbot to assist JEE aspirants with doubts in Physics, Chemistry, and Mathematics. It uses Retrieval-Augmented Generation (RAG) with Meta's Llama 3.2 to provide accurate, step-by-step solutions by retrieving relevant information from JEE textbooks, past papers, and solved examples.Data is extracted and cleaned using PyPDF2 and Unstructured.io, then converted into embeddings with Hugging Face's sentence transformers and stored in ChromaDB for efficient retrieval. The RAG pipeline, implemented with LangChain, integrates the vector database with Llama 3.2 for context-aware responses. LoRA fine-tuning enhances accuracy on JEE-specific Q&A pairs. The backend, built with FastAPI, offering a robust and scalable API for handling user queries. The frontend, developed using Streamlit (for MVP) or React (for production), provides a user-friendly interface where students can input doubts via text or voice. Advanced features like LaTeX rendering for equations, progress tracking, and mock test generation are incorporated to enhance usability. ensures scalable query handling, while the frontend, developed with Streamlit (MVP) or React (production), offers a user-friendly interface with LaTeX support for equations, progress tracking, and mock test generation. Deployment utilizes Modal for serverless LLM hosting, Vercel for the frontend, and Fly.io for the backend. Redis caching improves response times. This project demonstrates AI/ML, cloud deployment, and full-stack development expertise, providing a scalable and practical solution to help JEE aspirants.

PREDICTIVE MODELLING AND ANALYSIS OF CRIME USING MACHINE LEARNING

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ABSTRACT

A methodical approach to detecting crimes is crime analysis and prediction. This system can visualize areas that are prone to crime and predict areas with a high likelihood of crime. We can extract previously undiscovered, valuable information from unstructured data by using the data mining concept. The current datasets are used to forecast the extraction of new information. Crime is a perilous and widespread social issue that affects people all over the world. Crimes have an impact on a country's reputation, economic growth, and quality of life. Advanced systems and innovative methods for enhancing crime analytics are required to safeguard communities and secure society from criminal activity. We suggest a system that can analyze, identify, and forecast different crime probabilities in a specific area. This study uses a number of data mining techniques to explain different forms of criminal analysis and crime prediction.[1]

KEYWORDS

Machine Learning, Decision Tree, Random Forest, Logistic Regression, Dataset.

SECURE E-COMMERCE PLATFORM WITH OTP-BASED EMAIL VERIFICATION

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ABSTRACT

This project presents a secure and efficient e-commerce platform built using Django, integrating OTP based email verification for user authentication. The system ensures enhanced security by requiring users to verify their email addresses through a One-Time Password (OTP) during registration and login processes. The platform enables seamless product management, category-wise organization, and a user-friendly shopping experience. It employs Django for the backend, SQLite for database management, and HTML, CSS, Bootstrap for responsive frontend design. Additionally, media file handling ensures proper storage and retrieval of product images. The OTP verification mechanism is implemented using Django's built-in email services, ensuring a robust authentication process. This project enhances security, improves user trust, and provides a scalable e-commerce solution with a well-structured category and product management system.

BONE FRACTURE DETECTION AND CLASSIFICATION USING DEEP LEARNING

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ABSTRACT

The bone is a major component of the human body. Bone provides the ability to move the body. The bone fractures are common in the human body. The doctors use the X-ray image to diagnose the fractured bone. The manual fracture detection technique is time consuming and also error probability chance is high. Therefore, an automated system needs to develop to diagnose the fractured bone. The Deep Neural Network (DNN) is widely used for the modeling of the power electronic devices. In the present study, a deep neural network model has been developed to classify the fracture and healthy bone. The deep learning model gets over fitted on the small data set. Therefore, data augmentation techniques have been used to increase the size of the data set. The three experiments have been performed to evaluate the performance of the model using softmax and Adam optimizer. The classification accuracy of the proposed model is 92.44% for the healthy and the fractured bone using 5 fold cross validation. The accuracy on 10% and 20% of the test data is more than 95% and 93% respectively. The proposed model performs much better than of the 84.7% and 86%

KEYWORDS

Bone Fracture Detection , Deep Learning , Deep Neural Network (DNN), Fractured Bone Classification , X-ray Diagnosis , Automated Detection System , Adam Optimizer, 5-Fold Cross Validation , Healthy vs. Fractured Bone

AI-DRIVEN EMOTION RECOGNITION TRAINING FOR CHILDREN WITH AUTISM

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ABSTRACT

This project presents a system for detecting and predicting facial emotions in children with Autism Spectrum Disorder (ASD) to improve their social interactions and learning experience. The main purpose of face emotion recognition is to analyze and interpret human facial expressions to identify emotional states such as happiness, sadness, anger, surprise, fear, and disgust. It leverages machine learning and deep learning algorithms to analyze the movements and configurations of facial features, such as the eyes, mouth, and eyebrows, to classify emotions. The system utilizes real-time facial expression recognition (FER) to assess the emotional state of children. If the system detects positive emotions (e.g., happiness), it triggers interactive audio playback, such as rhymes or educational content, to engage and relax the child, thereby enhancing their learning process. This integrated approach aims to create a supportive and adaptive learning environment for children with ASD, promoting better emotional regulation and cognitive development through personalized audio-visual interactions.

KEYWORDS

Autism Spectrum Disorder (ASD), Facial Emotion Recognition (FER), Deep Learning, Convolutional Neural Networks (CNN), Interactive Audio, Emotion-based Learning, Real-time Monitoring , Audio-Visual Interaction, Personalized Learning.

FACE TRACKING AI ATTENDANCE SYSTEM

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ABSTRACT

The 'Face Tracking AI Attendance System' is an advanced, contactless solution for automating attendance processes using computer vision and artificial intelligence. This project integrates real-time face detection, recognition, and tracking technologies to identify individuals and record their attendance with minimal human intervention. The system uses a live video feed from a camera to continuously monitor a specific area such as a classroom or office. It applies machine learning algorithms to detect and recognize registered faces, updating the attendance log in real time. The use of face tracking ensures that the system can follow a moving subject, maintaining accuracy and consistency. This approach enhances security, reduces proxy attendance, and eliminates the need for physical input methods like biometric scanners or manual logs. It is scalable, efficient, and especially useful in educational institutions and corporate environments aiming for automation and hygiene compliance. The project leverages tools such as OpenCV, face recognition libraries, and Python-based backends for implementation. It also ensures data privacy and is designed to be user-friendly and easy to integrate with existing systems

SMART KERNEL BLOCK BASED MORPHING DETECTION AND ELIMINATIN IN SERVER

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ABSTRACT

Image block matching is the main step of duplicated region detection for exploring copy-paste image forgery. Several manipulations have been made in images due to high powerful tool evolvement. A copy and move forgery may occur in images where they cannot be easily. The image are get analyzed particularly for the region where the image get forged.The region of the image get copy and paste will be known with the proposed Gaussian RBF kernel PCA. High computational time in this step is one of the most important problems to find similar regions. This project presents a block based digital image watermarking scheme that is dependent on the mathematical technique of singular value decomposition (SVD). Traditional SVD watermarking already exists for watermark embedding on the image as a whole. In the proposed approach, the original image is divided into blocks, and then the watermark is embedded in the singular values (SVs) of each block separately. Furthermore, we determine performance of proposed algorithm based on time complexity function. The experimental results and mathematical analysis demonstrate that two layer matching can be more time-efficient than previous common methods such as lexicographically sorting. The dimensionality of the feature vector representation gets high key points for the image matching. The proposed method detects the image feature with blurring, noise contaminated and the compression will be eradicated. Easiest identification of the image forgery with the editing technology or morphing can be made with computational efficiency .Through extensive experiments, the system is higher efficiency compared to the existing system. It is useful for capturing past time ranges whose patterns are similar to a query time range. The system detects the morphing upload persons IP address, MAC address and location to get a exact prediction.

STOCK MARKET TREND ESTIMATION USING MACHINE LEARNING

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ABSTRACT

This stock trend prediction technique has been developed as a web-based application project using Long Short-Term Memory (LSTM) neural network models. Streamlit was used to build the system, which enables users to provide a ticker symbol together with a captioned date range, forecast stock prices, and interact with the prediction. Historical stock data is retrieved and processed through an LSTM model that predicts temporal dependencies to predict future stock trends. The application enables users to better understand how the market behaves by visualizing actual historical data in comparison with predicted future trends. This is one of the ways deep learning can be applied for financial prediction while maintaining a simple interface designed for instantaneous predictions in real-time, therefore, it is beneficial to the investors and the researchers.

KEYWORDS

LSTM, Stock Trend Prediction, Streamlit, Deep Learning, Time Series Forecasting, Financial Analysis, Web Application

REAL-TIME INTELLIGENT SCHOOL BUS TRACKING SYSTEM

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ABSTRACT

The project focuses Our Advanced Real-Time School Bus Tracking System enhances school-parent communication by providing immediate updates on bus locations and arrival times through a responsive interface built with HTML, CSS, JavaScript, and Bootstrap, integrated with a Django backend. The system innovatively utilizes drivers' smartphone GPS capabilities instead of dedicated hardware, reducing implementation costs while maintaining accuracy. For student identification, we've implemented an NFC-based system where students tap their ID cards on a smartphone within the bus, automatically recording attendance and triggering real-time parent notifications when students board and reach home. Key features include live location tracking with estimated arrival times, geofencing alerts for route adherence, comprehensive attendance management, and an administrative dashboard for fleet oversight. The parent interface displays bus movements on an interactive map using Google Maps API, while the administrative panel provides real-time fleet status and attendance records. We've implemented robust notification systems that alert parents about delays, route changes, and student boarding status. The system addresses critical connectivity challenges through a data buffering mechanism that stores location updates locally during network outages and transmits them once connection is restored. Battery optimization algorithms adjust location sampling rates based on movement patterns, extending smartphone battery life during operation. All data is securely stored in a PostgreSQL database on AWS RDS with encryption both in transit and at rest to ensure student privacy and data protection compliance. The system streamlines transportation management through efficient data handling and automation, providing peace of mind to parents and valuable management tools to schools. Future enhancements include AI-powered route optimization, advanced analytics dashboards, integration with school management systems, and an emergency alert system for unexpected situations.

ROAD SIGN DETECTION USING RFID AND CLOUD-BASED DATA SHARING

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ABSTRACT

In modern smart transportation systems, the detection and interpretation of road signs is a crucial component to ensure vehicle safety and regulatory compliance. This project titled "Road Sign Detection Using RFID and Cloud-Based Data Sharing" presents an innovative approach to monitor and track road sign interactions using Radio Frequency Identification (RFID) technology. The system employs RFID tags embedded on road sign boards and an RFID reader module connected to an Arduino microcontroller. As a vehicle (or test object) equipped with the RFID reader passes a tagged sign, the system detects the signal, identifies the sign, and logs the data. The detected information is visualized through a custom-built Python-based dashboard using Tkinter, which displays real-time tag details, required actions, and alert notifications. Additionally, the system supports cloud-based data sharing by pushing detection records and violation logs to MongoDB Atlas. This enables remote tracking of which signs were crossed and whether the necessary actions (like stopping or reducing speed) were taken. Violations, if any, are logged and can be used to simulate fine generation, improving road discipline enforcement. This prototype highlights the potential of combining embedded systems, RFID technology, and cloud computing to develop intelligent road monitoring systems for future smart cities.

KEYWORDS

RFID, Road Sign Detection, Cloud Storage, Violation Logging, Smart Transportation, MongoDB Atlas, Python GUI, Tkinter, IoT, Embedded Systems.

HYPERBOLIC NANOSTRUCTURAL CATALYSIS IN PROTON DISENTANGLEMENT KINETICS

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ABSTRACT

The development of sustainable energy solutions has become a critical focus in mitigating climate change and transitioning toward a cleaner future. Among these, hydrogen stands out as a clean energy carrier with vast potential for decarbonizing industries, transportation, and power systems. The RPR process employs advanced thermochemical reactions under precisely controlled pressure conditions, ensuring energy efficient hydrogen production that is adaptable across various industrial applications. A comprehensive energy analysis calculates the operational requirements, enabling scalable hydrogen generation without compromising efficiency. To enha nce the security and reliability of data involved in the RPR process, the integration of the Triple Data Encryption Standard (TripleDES) algorithm is introduced. This encryption technique protects sensitive process data by securely encrypting and managing operational parameters, performance metrics, and other critical information, ensuring secure communication and data integrity during hydrogen production and distribution. A crucial aspect of this research is the environmental evaluation of the RPR process. A comparative analysis of CO_2 emissions between RPR based hydrogen production and conventional fossil fuel usage demonstrates a significant reduction in the carbon footprint, emphasizing the potential of green hydrogen as a sustainable alternative to traditional energy sources. The results of rigorous environmental assessments validate the ecological benefits of the RPR process, including lower greenhouse gas emissions, improved energy efficiency, and enhanced sustainability. These findings reinforce the role of the RPR process in advancing clean hydrogen technology. By integrating efficiency, scalability, environmental stewardship, and robust data security through TripleDES encryption, the RPR process emerges as a transformative solution, paving the way for a sustainable, low-carbon future.

KEYWORDS

Rising Pressure Reformer (RPR), Green Hydrogen Production, Environmental Impact, Energy Efficiency, Sustainable Energy, Low-Carbon Future.

ADAPTIVE VIRTUAL INSTANCE CONSOLIDATION FOR ENHANCED LOAD BALANCING IN CLOUD DATA CENTERS

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ABSTRACT

For the benefit of commercial clients, cloud computing is capable of handling a sizable amount of expanding work in a planned manner. Virtualization, which generalizes the physical infrastructure and makes it simple to use and maintain, is the primary enabling technology for cloud computing. In this project virtualization is utilized to promote the idea of green computing and to allocate resources based on their requirements. Here, the idea of "skewness" is presented, where the same is minimized to mix diverse workloads to increase server utilization. Allocating resources on demand presents difficulties in managing client demand. In order to supply resources, Virtual Machine (VM) technology has been used. It is anticipated that employing a virtualized environment will shorten the average job response time and execute tasks in accordance with resource availability. As a result, VMs are assigned to the user based on the requirements of the position. When the execution is underway, the VM and PM (Physical Machine) mapping is made feasible by the VM live migration technology. Utilizing cloud resources efficiently and dynamically can assist balance the workload and prevent issues like system slowdowns. When several requests are made, this solution can employ a local negotiation-based VM consolidation technique to anticipate each task request, reduce overloads, and generate virtual space. The suggested solution uses a co-location strategy to combine tiny, empty rooms to generate new virtual space that boosts server performance. Implement self-destruction strategy as well to get rid of inaccurate data depending on time to live property. Real-time resource allocation is used to implement the suggested system. Create an online prediction model with this framework that can initially determine the partition sizes of reduction jobs in real time. Additionally, reducers with big partitions can dynamically identify data skewness and be given extra resources to help them finish more quickly.

KEYWORDS

Cloud Computing, Virtualization, Green Computing, Resource Allocation, Skewness Minimization, Virtual Machine (VM) Technology, VM Live Migration, Server Utilization.

ICU PATIENT RISK LEVEL MONITORING SYSTEM USING MACHINE LEARNING TECHNIQUES

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ABSTRACT

Modern Intensive Care Units (ICUs) provide continuous monitoring of critically ill patients who are susceptible to many complications affecting morbidity and mortality. ICU settings require a high staff-to-patient ratio and generate a vast volume of data. For clinicians, the real-time interpretation of this data and decision-making is a challenging task. Machine Learning (ML) Algorithms like Random Forest, Logistic Regression, Support vector classifier are making significant progress in ICUs by enabling the early detection of high-risk events due to increased processing power and freely available datasets such as the Medical Information Mart for Intensive Care (MIMIC). This project aims to explore New ML techniques like Gradient Boosting (XGBoost, LightGBM), Recurrent Neural Networks (RNN) /LSTM in ICU settings using MIMIC data. The approach will assemble qualified articles to gain insights into areas of application, clinical variables used, and treatment outcomes, which can pave the way for further adoption of this promising technology in routine clinical decision making. The lessons learned from research will provide guidance to researchers on the application of ML techniques, increasing their adoption in healthcare. The ICU patient risk level monitoring system will play a crucial role in improving patient safety, optimizing resource allocation, and enhancing clinical decision-making in intensive care settings. By continuously monitoring and analysing patient data, this system will provide valuable insights to help healthcare providers intervene promptly and prevent adverse outcomes.

KEYWORDS

Healthcare AI, Long Short-Term Memory (LSTM), Big Data Analytics, Decision Trees, Predictive Analytics, Automated Alert System, Real-Time ICU Patient Risk Prediction.

HACK & LEARN: A CTF-BASED CYBERSECURITY EDUCATION PLATFORM

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ABSTRACT

With the rise of cyber threats, hands-on cybersecurity education is more crucial than ever. Traditional learning methods often lack practical application, making it difficult for learners to develop real-world skills. To address this, we present Hack & Learn, a Capture The Flag (CTF)-based platform designed to provide an interactive and engaging learning experience. The platform consists of three challenge levels, each focusing on key cybersecurity domains: forensics, steganography, and GRUB bootloader misconfiguration. By solving these challenges, users enhance their problem solving abilities and gain practical knowledge in identifying and mitigating security vulnerabilities. Designed for both beginners and advanced learners, Hack & Learn offers a structured, gamified approach to cybersecurity training. Through real-world attack and defense simulations, users develop essential technical skills in a safe and controlled environment. The platform not only strengthens cybersecurity awareness but also fosters critical thinking, equipping learners with the expertise needed to tackle modern security challenges.

Keywords

Cybersecurity, Capture The Flag (CTF), Hands-on Learning, Forensics, Steganography, GRUB Bootloader Misconfiguration, Cybersecurity Training, Gamification, Cyber Threats, Ethical Hacking, Problem-Solving, Security Vulnerabilities, Real-World Simulations, Cyber Defense.

AI - ENHANCED SURVEILLANCE FOR ENTRANCE EXAMINATION SECURITY

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ABSTRACT

Examination fraud poses a significant challenge to the integrity of academic institutions and certification bodies. Traditional methods of invigilation and identity verification often fall short in preventing impersonation and cheating. This project introduces an AI-powered face detection system to identify and prevent fraudulent candidates during examinations. The system leverages deep learning-based facial recognition techniques to verify the candidate identity by matching their face against pre-registered images in real time. The proposed system utilizes Convolutional Neural Networks (CNN) and Haar Cascade classifiers for accurate face detection and recognition. During the examination process, live video feeds are analyzed to ensure the candidate identity remains consistent throughout the session. Any discrepancies, such as unauthorized individuals attempting to take the exam on behalf of others, trigger real-time alerts to exam authorities. The system enhances security by integrating with databases for automated identity verification, reducing human intervention and improving efficiency. This approach offers a non-intrusive, reliable, and scalable solution to combat examination fraud. By ensuring strict authentication protocols, it significantly enhances the credibility of online and in-person examinations. The system adaptability allows for integration with various examination platforms, making it a valuable tool for universities, certification bodies, and recruitment agencies. Future advancements may include emotion detection and behavioral analysis to further strengthen fraud prevention mechanisms.

SMARTCOOK: INTELLIGENT RECIPE MATCHING WITH PHOTO-BASED INGREDIENT RECOGNITION

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ABSTRACT

The SmartCook: Intelligent Recipe Matching with Photo-Based Ingredient Recognition project is a major step toward building a robust and intelligent system. This phase is dedicated to backend development, API integration, and implementing TensorFlow for advanced image recognition. Using Django as the backend framework and PostgreSQL for data storage, the focus will be on secure user authentication, efficient data management, and smooth server-side functionality. APIs will facilitate smooth communication between the front-end and back-end, enabling key features such as ingredient input, recipe retrieval, and personalized suggestions. TensorFlow will be utilized to develop a photo based ingredient recognition system, training models on labeled datasets to accurately detect ingredients from uploaded images. The backend will process these detections, match them with stored recipes, and generate customized recommendations for users. Rigorous unit and integration tests will ensure the reliability and performance of the backend. With of continuous monitoring and performance tracking will be the foundation of an intelligent, smooth, and friendly SmartCook platform.

AI-POWERED WATER QUALITY PREDICTION SYSTEM: SCALABLE STACKING ENSEMBLES WITH EXPLAINABLE SHAP-LLM INSIGHTS

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ABSTRACT

Ensuring safe drinking water requires not only high-accuracy predictions of potability but also clear, actionable insights for end users. This project leverages a **stacked machine-learning classifier**—an ensemble of Random Forest, Decision Tree, and XGBoost models—to analyze nine key water quality parameters (e.g., pH, turbidity, conductivity) from a Kaggle dataset. During preprocessing, missing optional values are imputed with column means, and all inputs are validated against realistic bounds to guarantee data integrity. The stacking framework trains each base learner independently and then fits a meta-learner on their combined outputs, yielding superior generalization and robustness compared to any single model.

To bridge the gap between numerical predictions and user understanding, we integrate **SHAP-LLM based explanations**. First, we compute Shapley values for each feature to quantify its individual influence on the potability decision. These feature-level attributions are then formatted into natural-language prompts and fed to locally hosted open-source LLMs (Llama 2 2 B or Qwen 1.5 B) running on CPU. The LLM generates concise, context-aware narratives—e.g., "High turbidity increased risk because…"—so users receive both quantitative and qualitative reasoning behind each prediction.

Complementing this, our frontend employs interactive **visualization** modules built with React and Material-UI. Users can view dynamic charts—such as bar plots of feature importances and gauge indicators for overall water-safety scores—that make complex model internals digestible at a glance.

KEYWORDS

Stacked models, SHAP-LLM based explanations, visualization, stacking classifier, Random Forest, Decision Tree, XGBoost, Shapley values, Llama 2 2 B, Qwen 1.5 B, Kaggle dataset, FastAPI, React, PostgreSQL, scalability.

AUTOMATED STROKE PREDICTION USING MACHINE LEARNING AND DEEP LEARNING

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ABSTRACT

Stroke is a leading cause of disability and mortality worldwide. Accurate and early prediction of stroke is crucial for effective treatment and improved patient outcomes. This paper present as automated stroke prediction using deep learning, specifically Recurrent Neural Network (RNN), trained on multimodal image datasets, including computed Tomography(CT), Magnetic Resonance imaging (MRI), and Positron emission Tomography(PET). The proposed model leverages temporal dependencies in imaging sequences to enhance the prediction accuracy. Experimental results demonstrate the effectiveness of RNN in identifying stroke patterns, paving the way for advanced clinic decision support systems.

CNN-BASED VISUAL RECOGNITION SYSTEM FOR AIRCRAFT DETECTION IN AERIAL IMAGERY

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ABSTRACT

Self-contained air defence systems must detect threats in real time with quick accuracy to optimise operation efficiency and mission success. A deep learning-driven Convolutional Neural Network (CNN) architecture for real-time sensors and visual processing is presented in this paper towards enhanced situational awareness and response. TensorFlow and data augmentation as well as attention mechanisms are used in creating the system for utmost adaptability and resilience in the presence of congestion. The proposed model performs multimodal radar, infrared, and electro-optical processing to identify airborne threats like enemy aircraft, missiles, and drones. Feature extraction, classification, and decision-making layers form the architecture that enables threat evaluation in real time. Transfer learning and self-supervised learning techniques improve the model's generalisability across diverse operating environments. Additionally, an adaptive feedback loop learns in real-time from emerging patterns of hostile events to enhance detection accuracy. Experimental results demonstrate the system's high accuracy and long-term performance compared to traditional rule-based and heuristic methods. Edge computing integration offers on-device or on-board processing with low latency. With the application of deep learning and real-time data fusion, this system increases aircraft survivability and autonomous decision-making in realistic combat situations. Reinforcement learning for optimising defence countermeasures and improved autonomous engagement strategies will be presented as future work.

KEYWORDS

Deep learning, CNN, autonomous defence, aircraft security, threat detection, real-time processing, sensor fusion, TensorFlow, attention mechanisms, adaptive learning, situational awareness, transfer learning, reinforcement learning, edge computing, mission success.

COMPHREHENSIVE SOFTWARE TESTING USING AGILE METHODOLOGY AND INDUSTRY TOOLS

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ABSTRACT

This project focuses on the comprehensive software testing process using various industry standard tools and methodologies, including JIRA and automation testing with script less tools. The primary objective is to evaluate and enhance the quality and functionality of software products through rigorous defect management and test case management practices. By applying Agile methodology, the project ensures flexibility and continuous feedback, allowing for rapid iterations and seamless collaboration with clients. The testing process includes functional, performance, and integration testing using Postman for API testing. Defect management is tracked and organized through JIRA, ensuring transparency and accountability throughout the testing lifecycle. Additionally, the project emphasizes automation testing using script less tools, which simplifies the testing process, reduces manual effort, and increases efficiency. This approach not only accelerates the testing process but also helps in early identification of defects, improving overall software quality and user satisfaction. The project culminates in detailed documentation, providing insights into best practices and effective tools for modern software testing.

DETECTION OF CARDIOVASCULAR DISEASE IN ECG BY USING MACHINE LEARNING AND DEEP LEARNING MODELS

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ABSTRACT

Cardiovascular disease (CVDs) remain a leading came of mortality worldwide, necessitating early and accurate detection for effective intervention. Electrocardiogram(ECG) imaging serves as a vital diagnostic tool, capturing electrical activity of the heart, Leveraging advancements in machine learning(ML) and deep learning(DL), this study proposes a comprehensive framework for the automated detection of CVDs from ECG images. The methodology involves pre-processing ECG data, feature extraction, and classification using ML and DL techniques. Specifically, Conventional Neural Networks (CNNs) are employed to extract intricate patterns from ECG images, while ML algorithms such as support vector machines(SVMs) and random forests (RFs) are utilized for classification. The proposed approach demonstrated promising results in terms of accuracy, sensitivity, and specificity, showcasing its potential as a robust tool for early CVD detection. Cardiovascular diseases (CVDs) represent a significant global health burden, necessitating efficient and accurate diagnostic methods for timely intervention. Electro car diagram (ECG) imaging serves as a cornerstone in CVD diagnosis, capturing the electrical activity of the heart. In this study, we propose a rovel approach for the automated detection of CVDs from ECG images, leveraging state-of-the-art machine learning (ML) and deep learning(DL) techniques.

KEYWORDS

Cardiovascular, deep learning, (ECG) images, feature extraction, machine learning

DIABETIC DIAGNOSIS USING MACHINE LEARNING AND DEEP LEARNING ALGORITHM WITH CHATBOT INTERFACE SUPPORT

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ABSTRACT

A two-phase intelligent method for identifying diabetes and determining it severity is presented in this project. A gradient Boosting Machine Learning algorithms is used in the first phase to determine a person's likelihood of having diabetes based on conical input data like blood pressure, glucose level and body mass index. The system moves on to a second stage if the user is anticipated to have diabetes. In the stage, retinal pictures are analysed using the Lenet onvolutional Neural Network (CNN) to categorize the diabetic condition into three levels: low, medium and high. Personalized recommendations, such as food programs, control techniques, and preventive measures, are given based on the classification. The robustness of the suggested approach was confirmed when the system was tested against more conventional architectures such as Manual Net. which underperformed LeNet. This comprehensive system helps with individualized diabetes care and improves early diagnosis.

KEYWORDS

Conical, Machine Learning, gradient boosting, retinal pictures, robustness, conventional architectures, diagnosis.

DIABETIC RETINOPATHY DETECTION USING DEEP LEARNING

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ABSTRACT

Is human eye illness which occurs in individuals who have diabetics which harms their retina and in the long run, may lead visual deficiency. Till now DR is being screened manually by ophthalmologist which is a very time consuming procedure. And henceforth this task (project) focuses on analysis of different DR stages, which is done with Deep Learning (DL) and it is a subset of Artificial Intelligence (AI). We trained a model called DenseNet on an enormous dataset including around 3662 train images to automatically detect the DR stage and these are classified into high resolution fundus images. The Dataset which are using is available on Kaggle (APTOS). There are five DR stages, which are 0, 1, 2, 3, and 4. In this paper patient's fundus eye images are used as the input parameters. A trained model (DenseNet Architecture) will further extract the feature of fundus images of eye and after that activation function gives the output. This architecture gave an accuracy of 0.9611 (quadratic weighted kappa score of 0.8981) to DR detection. And in the end, we are comparing the two CNN architectures, which are VGG16 architecture and DenseNet121 architecture

KEYWORDS

Diabetic Retinopathy, Deep Learning ,Convolutional Neural Networks (CNN),Retina Image Analysis, Fundus Images, OCT (Optical Coherence Tomography) Imaging

HARNESSING MACHINE LEARNING FOR CUSTOMER RETENTION AND LOAN DECISIONS USING ARTIFICAL INTELLIGENCE

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ABSTRACT

In the corporate world, Machine Learning (ML) Provides an effective toolkit to build better client interactions and make wise loan choices. ML models can find hidden trends in customer behavior and retention by sorting through massive amounts of data. With the use of these information, companies may develop more inclusive loan evaluations, foucs marketing efforts, expedite procedures, and proactively keep clients who are at risk of leaving. Responsible AI procedures, on the other hand, are crucial because they guarantee explainability, equity, and transparency throughout the creation and application of these models. Deep learning and other cutting-edge methods could lead to even bigger improvements in lending decision-making and customer retention as machine learning develops.

KEYWORDS

Machine Learning (ML), Customer Retention, Loan Decisions, Artificial Intelligence (AI), Data Analysis, Predictive Modeling.

SECURE DATA PRIVATE SENSITIVE DATA SHARING FOR AES, RSA AND TRIPLE DES AGGREGATING ADMINISTRATIONS

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ABSTRACT

Distributed storage administrations have acquired prominence because of their comfort and adaptability. In any case, security concerns in regards to delicate information sharing stay a critical test. To resolve this issue, we propose an original methodology for secure public delicate information partaking in distributed storage frameworks. Our answer utilizes the High level Encryption Standard (AES) ,(RSA), (TRIPLE DES)calculation for information encryption, guaranteeing hearty security against unapproved access. The center thought of our framework is to use advanced marks to lay out information realness and respectability, subsequently working with controlled public information sharing. Clients can safely transfer and offer delicate documents with others, without undermining their security. The application incorporates SQL, Java, HTML, CSS, and Bootstrap to make an easy to understand interface, empowering consistent route and cooperation.

A REVIEW ON SOCIAL MEDIA AND TRUST FOR DETECTING GROUPS OF COLLUDED AGENT

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ABSTRACT

Collusion is a malicious activity that is primarily frequent in colluded agent-based recommender systems, in which two or more groups of agents agree with each other to mutually exchange positive feedback to gain undue advantages by altering the correct computation of reputation measures in their group of agent communities. The identification of colluding agents is an important issue and several strategies have been taken. Among them, the Eigen-Trust algorithm is well known, also it is limited by the necessity of knowing a priori which agents are considered as trustworthy and the impossibility of recognizing several groups of colluding agents acting simultaneously and autonomously. This paper aims to deal with the above issues and, to this end, we will present a strategy to support Eigen-Trust both providing the necessary inputs about pre-trusted agents and recognizing groups of malicious agents. In particular, we combined Eigen-Trust with a clustering process to suitably group the agents according to their reputation scores.

Keywords: Collusion, Colluded Agent Groups, Eigen-Trust, Clustering, Social Media

GUARDIANS OF REALITY: COMBATING DEEPFAKE TECHNOLOGY

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ABSTRACT

Artificial intelligence (AI) has advanced, and with it, the speed and sophistication of picture, video, and audio manipulation techniques have increased. Computers are gaining the ability to influence media in an increasing. Convincing methods, including using a duplicate of a well- known person's voice or superimposing a visage on another. Deepfakes are the term for this kind of media output. Nowadays, there are two kinds of detection methods in use: manual and algorithmic. Conventional manual methods are among the approaches that make use of human media analysts who have access to software. Algorithmic detection uses artificial intelligence (AI)-based algorithms to identify corrupted media. In this study, an effective deep learning-based technique that can discriminate between authentic videos and artificial intelligence-generated phony ones. This paper has a deep learning approach that successfully separates actual videos from artificial intelligence (AI)-generated fraudulent videos.

KEYWORDS

Deepfake Detection, Convolutional Neural Networks, Generative Adversarial Network

IMAGE-BASED CAPTCHA AND SMART ATTENDANCE SYSTEM USING FACE RECOGNITION

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ABSTRACT

These old-style CAPTCHAs based on elaborate text distortions are more and more vulnerable to efficient automated attacks and they also can be quite difficult to use for certain people. On the other hand, the single manual tracking of attendance in schools or other places is not only inefficient and a waste of time but also error-prone, because it is affected by the same inaccuracies which occur in the context of proxy attendance. In this paper, a hybrid system is introduced in which the two problems are treated in a holistic way by using updated computer vision techniques. Apart from discussing, in short, the altered approach that fuses CAPTCHA and visual recognition, the paper will also illustrate the benefits of combining two separate systems for CAPTCHA and attendance control respectively. This is the core idea around which the mechanism of our paper has been developed. One important part of the security method we are proposing is implementing real-time] Face Lookup that takes place during the verification phase. Only then, if breaches in the visual- and the knowledge-based authentication are identical, will the final score be the result of the overall fulfillment of the situation. In addition, the authors provide an abundant source of knowledge for future work on the topic as the last part of the paper. Also, the authors give details about the system's responsiveness in [Reference to Real-time Re-identification Processes for Edge Devices] and compare it with similar procedures.Some of the Simple CAPTCHA Replacements which are being used recently. Here are a number of tasks that humans can perform and that computers cannot, or at least not overtly: visual. The authors introduce a method that uses the invariant properties of the human face to create the CAPTCHA instead of intentionally creating the images like AI designers do. That is to say, specifically what the authors have done is to generate the CAPTCHAs non-working robots can handle while humans cannot. That is, the HAR layer, for example, discriminates human actions with an accuracy rate of 93.3%, while the LBP feature works rather the same, distinguishing different regions on a person's face satisfyingly but taking a longer time (the distribution and size of the regions are the critical things). The following bit of text has been completed from the authors' work. Due to the potential of real-time face recognition, there could be suggested ways of improving the attendance.

PHYSIS: A COMPREHENSIVE WEB-BASED PHYSICS CALCULATOR

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ABSTRACT

Physics students and researchers frequently require fast and precise calculations for a variety of physical concepts and unit conversions. Physis: A Comprehensive Web-Based Physics Calculator is a Tkinter-based multi-functional application designed to aid BSc Physics students by offering an interactive platform for essential physics computations and unit conversions. The tool supports calculations related to Projectile Motion, Ohm's Law, Energy Conversion (Joule to eV), Frequency-Wavelength, Specific Heat Capacity, and Kinetic Energy, in addition to unit conversions for time, speed, volume, and currency exchange. Physis incorporates a secure authentication system with database storage, allowing users to maintain personalized access and save their past calculations. Designed for accuracy and efficiency, the application leverages a modular structure and object-oriented programming (OOP) principles to ensure seamless functionality.This paper explores the design, implementation, and impact of Physis, emphasizing its role in simplifying complex physics calculations and enhancing students' problem-solving skills.

ALGORITHM FOR AIRLINE ERROR DELAYS PREDICTION TO ENHANCED PREDICTIVE ACCURACY

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ABSTRACT

Flight delay is inevitable and it plays an important role in both profits and loss of the airlines. An accurate estimation of flight delay is critical for airlines because the results can be applied to increase customer satisfaction and incomes of airline agencies. There have been many researches on modeling and predicting flight delays, where most of them have been trying to predict the delay through extracting important characteristics and most related features. However, most of the proposed methods are not accurate enough because of massive volume data, dependencies and extreme number of parameters. This paper proposes a model for predicting flight delay based on Deep Learning (DL). DL is one of the newest methods employed in solving problems with high level of complexity and massive amount of data. Moreover, DL is capable to automatically extract the important features from data. Furthermore, due to the fact that most of flight delay data are noisy, a technique based on stack denouncing auto-encoder is designed and added to the proposed model. Also, Ehrenberg-Marquart algorithm is applied to find weight and bias proper values, and finally the output has been optimized to produce high accurate results. In order to study effect of stack denouncing auto-encoder and LM algorithm on the model structure, two other structures are also designed.

First structure is based on auto-encoder and LM algorithm (SAE- LM), and the second structure is based on denouncing autochanger only (SDA). To investigate the three models, we apply the proposed model on U.S flight dataset that it is imbalanced dataset. In order to create balance dataset, under sampling method are used. We measured precision, accuracy, sensitivity, recall and F-measure of the three models on two cases. Accuracy of the proposed prediction model analyzed and compared to previous prediction method. results of three models on both imbalanced and balanced datasets shows that precision, accuracy, sensitivity, recall and F-measure of SDA-LM model with imbalanced and balanced dataset isimprovement than SAE-LM and SDA models. The results also show that accuracy of the proposed model in forecasting flight delay on imbalanced and balanced dataset respectively has greater than previous model called RNN.

COMMODITY PRICE PREDICTION SYSTEM FOR AGRI-CULTURAL PRODUCTS USING MACHINE LEARNING

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ABSTRACT

This innovative commodity price prediction system addresses a significant market intelligence gap in Tamil Nadu by leveraging ARIMA-based economic modeling to forecast price trends for key pulses and vegetables across the agricultural and horticultural sectors. The comprehensive architecture integrates multiple data sources—including automated price data retrieval systems, historical trend analyses, weather pattern correlations, and seasonal variation factors—to generate highly accurate forecasts that significantly outperform conventional methodologies. The system delivers actionable intelligence through a Flask-powered web application interface that simultaneously displays price predictions and real-time arrival stock information, enabling stakeholders to monitor market dynamics with unprecedented clarity. A distinctive feature of this pioneering system is its capacity to inform strategic buffer stock management decisions that effectively mitigate supply-demand imbalances during seasonal fluctuations and market disruptions. As the first specialized forecasting platform developed specifically for Tamil Nadu's agri-horticultural ecosystem, the system incorporates sophisticated correlation and trend analyses that continuously refine predictive accuracy by identifying complex relationships between diverse market variables. The seamless integration of meteorological data enhances the model's seasonal adaptability, allowing for dynamic forecast adjustments based on changing weather conditions that impact crop yields and market supply. This multifaceted approach delivers comprehensive market intelligence to a diverse stakeholder ecosystem—including farmers, traders, processors, distributors, policymakers, and consumers— empowering them with reliable forecasts to optimize planting decisions, negotiate fair prices, manage inventory effectively, implement timely market interventions, and ultimately contribute to greater stability and efficiency across Tamil Nadu's agricultural value chain.

KEYWORDS

Commodity price prediction, ARIMA models, Tamil Nadu, market intelligence, buffer stock management, time series forecasting, price trends, pulses, vegetables, seasonal fluctuation, weather data integration, commodity availability monitoring.

EMOTION ANALYSIS FOR SCAM DETECTION IN SOCIAL MEDIA AND COMMUNICATION PLATFORMS: USING MACHINE LEARNING

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ABSTRACT

This project is about identify scam patterns in text data such as email, social media posts, or instant messages. Scammers often use emotional manipulation to deceive victims from various sources. The goal is to detect potential scam messages by analyzing sentiment and identify the scam related patterns. Here, it aims to combat phishing and fraud in communication channels and enhancing network security. Random Forest algorithm is used in Deep Neural Networks are trained to classify messages as either genuine or potentially fraudulent based on extracted sentiment and emotion features. In this proposed paper, it checks the genuine emotions and identifies the fraudulent text patterns to deduct scams.

EMPOWERING IOT CYBER NETWORKS ATTACK USING MACHINE LEARNING

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ABSTRACT

This abstract explores a double-edged sword: the potential for machine learning to both empower and threaten IoT cybersecurity. On the one hand, machine learning algorithms can be harnessed to analyze vast amounts of data collected from IoT devices. This analysis can unearth hidden patterns in network traffic, identify anomalies indicative of cyberattacks, and predict future threats. By implementing such machine learning models, we can proactively strengthen IoT network defenses and minimize the impact of potential attacks. However, the same machine learning techniques could be exploited by malicious actors to launch more sophisticated cyberattacks. Adversaries could train algorithms to exploit vulnerabilities in IoT devices or networks, potentially bypassing traditional security measures. Therefore, it's crucial to acknowledge the potential for misuse while harnessing the power of machine learning for robust IoT cybersecurity.

Keywords

IoT Cybersecurity, Machine Learning, Cyberattacks, Anomaly Detection, Threat Prediction, Network Defence, Vulnerability Exploitation, Adversarial Machine Learning.

INNOVATIVE SOLUTIONS FOR BLOOD SUGAR MONITORING SMART CONTACT LENSES

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ABSTRACT

Blood sugar regulation functions of the body suffer from chronic impairment in individuals with diabetic conditions. Glucose monitoring needs to be precise in order to shield patients from dangerous health complications which include heart disease alongside kidney failure and vision loss. Diabetes exists in more than 400 million human patients across the globe. The management of the condition requires patients to regularly check their blood sugar levels. People using standard glucose monitoring devices need to stab themselves with fingers multiple times daily while facing both pain and inconvenience and potential errors in the process. Continuous Glucose Monitors (CGMs) exist in the market although their skin- mounted sensors require direct placement under the skin. Current blood sugar testing through finger pricking creates discomfort for patients and presents numerous inconvenience factors. Smart Contact Lenses give patients a safe method of continuous glucose monitoring that enhances both their comfort and usability. This manuscript investigates the development of smart contact lenses for blood sugar level monitoring and system deployment of diabetic diagnosis using smart lens together with the creation of smart wearable contact lenses. The implementation of non-invasive continuous accurate blood glucose monitoring enhances the lifestyle quality for individuals who have diabetes.

Keywords

Diabetes, GCM, Contact Lense, Machine Learning, Wearables.

INTELLIGENT TRAFFIC MANAGEMENT USING EDGE AI

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ABSTRACT

The Intelligent Traffic Management System using Edge AI is a transformative solution designed to enhance urban mobility through real-time traffic monitoring and optimization. Utilizing advanced artificial intelligence and edge computing, this system processes data locally, reducing latency and enabling instant decision-making. Equipped with cameras and sensors, it dynamically adjusts traffic signals based on congestion levels, ensuring smoother vehicular movement and reduced delays.Beyond traffic flow optimization, the system plays a critical role in safety management by swiftly detecting accidents and violations, allowing authorities to respond promptly. It also prioritizes emergency vehicles, ensuring unimpeded passage during critical situations. The decentralized nature of edge AI minimizes reliance on centralized data centers, making the system more efficient, scalable, and adaptable to evolving traffic patterns. Additionally, predictive analytics embedded within the system provide insights for urban planners, facilitating informed infrastructure improvements. By integrating AI-driven automation with real-time decision-making, this approach leads to enhanced commuter experiences, lower environmental impact, and a more resilient traffic ecosystem.

Keywords

Edge AI, Real-time Traffic Monitoring, Congestion Management, Accident Detection, Emergency Vehicle Priority, Predictive Analytics

REAL-TIME CHAT APPLICATION WITH WEBSOCKET FOR NETWORK EFFICIENCY

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ABSTRACT

The system focuses on the development of a Real-Time Chat Application leveraging WebSocket technology to enhance network efficiency and provide seamless communication. Unlike traditional HTTP-based communication, which involves multiple requests and increased latency, WebSocket's establish a persistent connection between the client and the server. This allows real-time data transmission with reduced overhead and faster response times.The application aims to deliver an intuitive and responsive user interface where messages are instantly sent and received without frequent polling. The server efficiently manages multiple concurrent connections and broadcasts messages to all connected clients with minimal bandwidth usage. the system not only explores the advantages of WebSocket over conventional HTTP protocols but also implements robust message handling, user authentication, and error management mechanisms to ensure a reliable chat experience.By demonstrating the efficiency and scalability of WebSocket-based communication, this project underlines the potential of WebSocket's in building real-time applications such as chat systems, gaming platforms, and collaborative tools.

Keywords

Real-time communication, WebSocket protocol, Network efficiency, Low-latency messaging, Client-server architecture, Bidirectional data transfer, JavaScript, Node.js, Socket.IO, Chat application, Instant messaging, Event-driven programming, Asynchronous communication, Browser-based chat, Minimal network overhead.

TRANSFORMING ANIMAL TRACKING FRAMEWORKS USING WIRELESS SENSORS AND MACHINE LEARNING ALGORITHMS

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ABSTRACT

Conventional animal tracking systems such as physical human observation, animal ear tagging or notching raises serious concerns over the observation and animal handling techniques that may sometimes cause stress and disruptions to animal ecology. Wireless sensor networks on the other hand hold real promise for animal tracking due to their accuracy, scalability, and ethical consideration frameworks involved. To test machine learning algorithms in a wireless sensor framework, a simulation was carried out to illustrate the behavior of a Wireless sensor network to draw conclusions. The capacities of different algorithms for location estimation and assessment of performance were also analyzed and the results demonstrates great potentials of a WSN for efficiency in farm monitoring, where parameters such as location and sensor accuracy can be monitored in real time. This project aimed to develop an innovative animal tracking system using wireless sensors and machine learning algorithms. The system enhances accuracy, scalability, and cost-effectiveness, providing valuable insights into animal behavior and habitat. Our team successfully designed and implemented a prototype, achieving:

95% accuracy in animal tracking
30% reduction in costs compared to traditional methods
Real-time monitoring and alerts
Improved data analysis and visualization

Keywords

Algorithms, Sensor Networks, Tracking, Monitoring, Machine learning, Sensor, Algorithm.

VISUALLY AID: SEEING WITH SOUND FOR THE VISUALLY IMPAIRED

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ABSTRACT

An assistive technology called Seeing with Sound for the Visually Impaired was created to help people who are blind or visually impaired better access and comprehend their environment. This portable device uses a Raspberry Pi Zero 2W, a camera, Time-of-Flight (TOF) sensors, GPS, and audio output to identify text, detect objects, and provide vocal feedback to users. The gadget extracts text from photos using Tesseract's Optical Character Recognition (OCR) technology, and then instantly turns that text into voice using Google Text- to-voice (gTTS). Preprocessing methods including adaptive thresholding, blurring, and grayscale conversion are used by the system to increase the accuracy of text recognition. The Room Mapping Assistant is a crucial component of this gadget that facilitates user navigation in interior areas. It maps room layouts, identifies obstructions, and provides real- time auditory assistance for safe passage using TOF sensors. Visually Aid, which is small, inexpensive, and simple to use, is made for daily usage and gives the blind and visually impaired the ability to move more confidently and independently through their surroundings. The system's concept, implementation, and upcoming enhancements are presented in this article.

Keywords

Assistive Technology, Visually Impaired, Optical Character Recognition (OCR), Text-to-Speech (TTS), Real-Time Audio Feedback, Smart Device, Portable Assistive Device.

EARLY DETECTION OF OSTEOPOROSIS USING IMPROVED ANT COLONY OPTIMIZATION WITH K-NEAREST NEIGHBORS (IACO-KNN)

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ABSTRACT

Osteoporosis is a critical health condition characterized by reduced bone density and an increased risk of fractures. Early detection is essential for effective intervention and management. This paper presents a novel hybrid algorithm, Improved Ant Colony Optimization with K-Nearest Neighbors (IACO-KNN), for the early identification of osteoporosis. The IACO algorithm optimizes feature selection, while the KNN classifier ensures accurate classification. Experimental results demonstrate the superiority of the proposed method over traditional approaches in terms of accuracy, precision, recall, and computational efficiency.

Keywords - Osteoporosis, Ant Colony Optimization (ACO), Improved Ant Colony Optimization (IACO), K-Nearest Neigbors (KNN), Feature Selection, Classification, Medical Diagnosis.