

पेटेंट कार्यालय  
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(57) Abstract :

The present invention discloses an Artificial Intelligence (AI) and Machine Learning (ML) model management and training system configured to provide automated, adaptive, and governance-enabled lifecycle management of machine learning models. The system comprises a Data Ingestion and Preprocessing Module configured to collect structured and unstructured data from multiple sources and perform data transformation and feature extraction; a Training Orchestration Engine configured to coordinate distributed model training tasks and allocate computational resources; and a Model Registry and Version Control Module configured to maintain model artifacts, metadata, and dataset lineage. The system further includes a Deployment Module for production integration, a Performance Monitoring Module for evaluating operational metrics, and a Drift Detection Module for identifying deviations between live and historical data. An Automated Retraining Engine retrains models when predefined thresholds are exceeded. Additionally, an Explainability and Bias Analysis Module generates interpretable outputs and fairness metrics, while a Compliance and Audit Logs Module maintains immutable lifecycle records. The invention provides a closed-loop, scalable, and transparent framework ensuring sustained model performance, regulatory compliance, and operational reliability.

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