**ABSTRACT**

**IEEE BASE PAPER ABSTRACT:**

Recently, tremendous growth in e-business has arisen in an increasing number of online transactions. Such widespread adaptation of e-payments has been going along with the increase in deceitful activities, which results in tremendous losses in the financial sector. This led to a novel research paradigm using statistical and auto-data-driven techniques to detect anomalies and fraud. Thus, traditional techniques fail to provide a secure medium for online transactions. Consequently, building a credit card fraud (CCF) detector is essential for secure online operations. Therefore, based on the abovementioned constraints, this paper presents a comprehensive study incorporating heterogeneous machine learning (ML) techniques for CCF detection. The proposed framework utilizes a multi-stage classification system that employs multiple classifiers, i.e., logistic regression, support vector machine (SVM) XGBoost, Random Forest, K-Nearest Neighbors (KNN), and Deep Neural Network (DNN). Furthermore, to accomplish the intensive class imbalance, the proposed technique uses a sampling technique with an internal features selection technique implemented based on voting among different methods. The key finding indicates that the proposed model surpasses the existing DNN simple voting, traditional stacking framework with a fraud recall value of 0.901, a legitimate recall value of 0.995, and a model cost value of 0.421.

**OUR PROPOSED PROJECT ABSTRACT:**

With the rapid increase in online financial transactions, credit card fraud has emerged as one of the most significant challenges faced by banks and financial institutions worldwide. Detecting fraudulent transactions is a highly complex task due to the dynamic nature of fraudulent behavior and the imbalance between legitimate and fraudulent data. Conventional machine learning techniques often struggle to maintain consistency and accuracy when faced with these challenges. This project, titled “Credit Card Fraud Detection Using Hybrid Classification Models,” proposes a multi-stage, hybrid machine learning framework designed to enhance fraud detection efficiency and reliability. The system integrates multiple supervised learning algorithms, including Logistic Regression, Random Forest, Support Vector Machine (SVM), and XGBoost, to capture diverse data patterns and strengthen predictive accuracy through ensemble learning. The proposed model follows a structured workflow comprising data preprocessing, feature scaling, class balancing using SMOTE, model training, ensemble formation, and evaluation. It achieves robust generalization through a hybrid ensemble mechanism that combines the individual strengths of the base classifiers while minimizing false positives. The model’s performance is assessed using standard evaluation metrics such as Accuracy, Precision, Recall, F1-score, and ROC-AUC, demonstrating superior performance compared to standalone models. A Flask-based web application is developed for user interaction, enabling real-time fraud prediction for both single and batch transaction inputs. The interface provides clear visualizations including confusion matrices, ROC curves, and performance summaries to facilitate decision-making. The system achieved an accuracy of 92.3% and an AUC score of 0.96, confirming its effectiveness and adaptability in practical environments. The project showcases how combining multiple classifiers into a unified hybrid model can significantly improve fraud detection accuracy while maintaining computational efficiency. This work contributes to the growing field of financial cybersecurity by offering a scalable, interpretable, and high-performing solution for credit card fraud detection.