

A Hybrid Machine Learning Model for Secure UPI Transaction Fraud Detection

Komal Amol Meher¹ and Manjusha Dattatraya Jondhale²

^{1,2} Assistant Professor, Department of BBA-CA

Sahakar Maharshi Bhausahab Santuji Thorat Arts, Science and Commerce College, Sangamner.

gaikwadkomal989@gmail.com, manjushajondhale2@gmail.com

Abstract: *The rapid expansion of digital payment systems, particularly the Unified Payments Interface (UPI), has transformed the way financial transactions are conducted by offering speed, convenience, and accessibility. However, this growth has also led to a significant rise in fraudulent activities, posing serious challenges to financial security and user trust. Traditional fraud detection techniques, which are primarily rule-based, often fail to identify sophisticated and evolving fraud patterns, resulting in high false positives and delayed responses.*

This study proposes a hybrid machine learning model designed to enhance the detection of fraudulent UPI transactions. The model integrates multiple machine learning algorithms such as Logistic Regression, Decision Trees, Random Forest, and Support Vector Machines to leverage their individual strengths. By combining these approaches through ensemble techniques, the system improves prediction accuracy and reduces the chances of misclassification. The model is trained on historical transaction data, where key features such as transaction amount, frequency, location, and user behavior are analyzed to detect anomalies.

The proposed system emphasizes real-time fraud detection, enabling immediate identification and prevention of suspicious activities. Performance evaluation using metrics like accuracy, precision, recall, and F1-score demonstrates that the hybrid approach outperforms individual models and traditional methods. Additionally, the system is scalable and adaptable, making it suitable for handling large volumes of transaction data in dynamic environments.

Keywords: *UPI Fraud Detection , Hybrid Machine Learning , Digital Payment Security , Fraud Detection System , Ensemble Learning , Financial Cybersecurity , Anomaly Detection , Real-Time Processing , Transaction Monitoring , Machine Learning Algorithms*

