

Abstract

In the realm of financial fraud detection, the integration of Explainable AI (XAI) and Federated Learning (FL) presents an innovative approach to enhancing transparency and safeguarding privacy. This project leverages the Paysim1 dataset from Kaggle to evaluate transaction authenticity, identifying fraudulent activities with higher precision. The existing system primarily employs Deep Neural Networks (DNN), Recurrent Neural Networks (RNN), and Stochastic Gradient Descent (SGD) for fraud detection. While these methods offer significant insights, they often lack interpretability and require centralized data processing, raising concerns about privacy and model transparency. In contrast, our proposed system incorporates Decision Trees, Random Forests, and Gradient Boosting Machines (GBMs). These algorithms are selected for their robustness, ease of interpretation, and superior performance in handling complex datasets. Additionally, Federated Learning is utilized to ensure privacy by allowing models to be trained across decentralized devices without sharing raw data. This approach not only maintains data confidentiality but also fosters a collaborative learning environment that can enhance the accuracy of fraud detection models. The combination of Explainable AI and Federated Learning aims to address the critical need for transparent, privacy-preserving solutions in financial fraud detection.

Keywords: Financial Fraud Detection, Decision Tree, Random Forest, Gradient Boosting Machines (GBMs), Deep Neural Networks (DNN), RNN, Stochastic Gradient Descent