

AI-Based Fraud Detection System for Credit Card Transactions Using Machine Learning Techniques

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Abstract: Credit card fraud continues to pose a significant challenge in the modern digital economy. Conventional detection systems often struggle to keep up with the dynamic and sophisticated tactics employed by fraudsters. This study introduces an AI-driven fraud detection framework that utilizes machine learning techniques—including Random Forest, Logistic Regression, and Neural Networks—to identify potentially fraudulent transactions. A publicly accessible dataset containing authentic transaction records was utilized, with preprocessing techniques like feature scaling and synthetic oversampling implemented to address class imbalance. Among the tested models, the Random Forest algorithm delivered the most favorable results in terms of both accuracy and recall. Additionally, a real-time fraud detection interface was developed using Flask, enabling user-friendly interaction and live predictions. The outcomes highlight the practicality of integrating intelligent algorithms to boost the effectiveness and accuracy of fraud detection systems. Future enhancements may involve incorporating deep learning approaches, adaptive learning mechanisms, and diverse data inputs to strengthen model robustness.

Keywords: fraud detection, credit card fraud, machine learning, Random Forest, Logistic Regression, Neural Networks, real-time prediction, data preprocessing, feature scaling, oversampling, classification accuracy, model recall, Flask, intelligent systems, precision, efficiency

