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Credit Card Fraud Detection Using Machine Learning

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Abstract:

Credit card fraud detection has become increasingly crucial due to the growth in online transactions, which form a significant portion of financial activities today. As a result, effective fraud detection systems are indispensable for banks and financial institutions. This project explores the application of machine learning techniques to detect and prevent credit card fraud, focusing on four primary categories of fraud in real-world transactions. Through rigorous experimentation and evaluation, we aim to identify the most effective machine learning models for each type of fraud, providing a comprehensive guide for selecting optimal algorithms. The study begins with an overview of the types of credit card fraud commonly encountered, including identity theft, card-not-present (CNP) fraud, counterfeit card fraud, and lost/stolen card fraud. Each of these fraud types presents unique challenges and requires different approaches for detection. To address these challenges, we employ a variety of machine learning algorithms, including but not limited to logistic regression, decision trees, random forests, support vector machines, and neural networks. The selection of models is based on their ability to handle the specific characteristics of each fraud type and their performance on the dataset provided. The data is pre processed to address issues such as missing values, noise, and class imbalance. One of the significant challenges in fraud detection is the skewed distribution of data, where fraudulent transactions are hugely outnumbered by correct ones. To effectively manage this imbalance, we implement various strategies, including oversampling, under sampling, and synthetic data generation techniques such as SMOTE (Synthetic Minority Over-sampling Technique). This project demonstrates the effectiveness of machine learning in detecting credit card fraud across various types of fraudulent activities. By evaluating and selecting the optimal models for each fraud type, and implementing a real-time detection system, we provide a robust solution to combat credit card fraud.

Technology and Frameworks used: Machine Learning Algorithms , Data Storage, Scikit-learn

Keywords: Machine Learning, Fraud Detection, Fraudsters, Model Performance.