Machine Learning Approaches for Credit Card Fraud Detection

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Abstract: *Credit card fraud detection is a critical challenge in the financial sector, necessitating the adoption of advanced machine learning algorithms for timely and accurate identification of fraudulent transactions. In this project, we investigate the efficacy of four prominent machine learning algorithms - Support Vector Machines (SVM), K-Nearest Neighbors (KNN), Decision Trees (DT), and Random Forest (RF) in detecting credit card fraud. Through a comprehensive analysis, we evaluate the performance of these algorithms in terms of accuracy, precision, recall, and F1 score using real-world credit card transaction datasets. SVM, known for its ability to construct complex decision boundaries, excels in separating fraudulent and legitimate transactions. KNN leverages the proximity-based approach to identify similarities with known instances of fraud, while Decision Trees offer interpretable insights into fraudulent patterns. Random Forest combines the predictive power of multiple decision trees to produce robust and accurate predictions. Our findings shed light on the strengths and weaknesses of each algorithm, providing valuable insights for developing effective fraud detection systems in the financial industry.*

Keywords: Credit Card Fraud, Machine Learning, SVM, KNN, RF, DT

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