

Course Code: CSE-707

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Section: 01

Comprehensive Analysis for Fraud Detection of Credit Card through Machine Learning

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1. Summary:

Parth et al. (2021) This article was conducted on Comprehensive Analysis for Fraud Detection of Credit Card through Machine Learning.

1.1 Motivation:

Credit card fraud is a serious and growing problem that poses a threat to financial institutions and their customers. Traditional fraud detection methods often fail to keep up with the increasing sophistication of fraudulent activity. There is a need for more efficient and automated methods to detect fraudulent transactions in real time. This motivates the exploration of machine learning techniques, which have shown promise in other domains of anomaly detection.

1.2 Contribution:

The paper presents a comprehensive analysis of various machine learning techniques for credit card fraud detection. The authors study various algorithms and compare their performance in terms of accuracy, precision, recall, and overall effectiveness in identifying fraudulent transactions. Their main contributions include: 1. A detailed comparison of multiple machine learning models. 2. An evaluation of these models using real-world credit card transaction data. 3. Insights into the strengths and weaknesses of different approaches for fraud detection.

1.3 Methodology:

The authors use a dataset of credit card transactions that includes both fraudulent and legitimate transactions. The data is preprocessed to handle missing values, normalize features, and encode categorical variables. Multiple machine learning algorithms including Local Outlier Factor, Isolation Forest, Support Vector Machines (SVMs) and Logistic Regression are trained on the dataset.

The performance of these models is evaluated using metrics such as accuracy, precision, recall, and F1 score. The paper compares the performance of these models to determine the most effective method for fraud detection.

1.4 Conclusion:

The study concluded that machine learning techniques, especially ensemble methods such as Isolation Forests, show superior performance in detecting credit card fraud compared to traditional methods. These

models provide high accuracy and low false positive rates, making them effective tools for real-time fraud detection.

2. Limitations:

2.1 First Limitation: The dataset used may not represent all types of fraud scenarios, potentially affecting the generalizability of the results.

2.2 Second Limitation: Some machine learning models, particularly neural networks, can be complex and resource-intensive, which may limit their practical deployment.

2.3 Third Limitation: The paper does not extensively address the performance of the models in real-time scenarios, which is crucial for practical fraud detection systems.

3. Synthesis:

In the future, the research can be including-

3.1 first Potential: Using more diverse and extensive datasets to better capture various fraud patterns and improve model generalizability.

3.2 Second Potential: Exploring and optimizing more advanced machine learning models and techniques, including deep learning approaches.