Enhancing Online Payment Fraud Detection : A Comprehensive Analysis and Classification Approach

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Abstract

The objective of this project is to use "Online payments fraud detection" dataset to conduct extensive dataset analysis for the purpose of detecting online payment fraud. We can learn more about the patterns and traits of fraudulent activity thanks to the dataset, which contains historical data on fraudulent transactions.
To comprehend the structure, distribution, and anomalies of the dataset, we perform a thorough exploratory data analysis (EDA). Next, we apply state-of-the-art techniques such as KNN, Decision tree and MLP classifier for precisely classifying fraudulent and non-fraudulent payments, focusing on the accuracy and performance of the models. The goal of this initiative is to lessen financial fraud and improve the security of internet payments.

Keywords

Data Security, Dataset Analysis, Classification, and Fraud Detection

1 Introduction

First of all, Online payments, which provide efficiency and convenience, have become a necessary aspect of our everyday life in the current digital era. On the other hand, as online transactions become more common, there is a greater chance of online payment fraud. For the banking sector and e-commerce platforms to protect their operations as well as the interests of customers, fraud detection and prevention are critical.
The goal of this project is to improve online payment fraud detection by using a methodical, data-driven methodology. We use a carefully selected dataset from Kaggle that offers past data on fraudulent transactions in order to accomplish this goal. We can explore the complex realm of online payment fraud with the help of this invaluable dataset.
Our main objective is to efficiently investigate, comprehend, and categorize fraudulent and non-fraudulent transactions by utilizing data analytic techniques, without delving into the field of machine learning. This strategy attempts to make a major contribution to the decrease in financial fraud and the security of online payments, offering a complete base for accomplishing these important goals.

Previous work

For a comprehensive understanding, consider consulting (1), (4), the findings in the conference paper by (2), (5), and the PhD thesis by (3).

2 Methods

In this project, we adopt a structured approach to investigate and enhance online payment fraud detection.
Our methodology can be summarized as follows:

1. Data Collection and Preprocessing：

Our main objective is to efficiently investigate, comprehend, and categorize fraudulent and non-fraudulent transactions by utilizing data analytic techniques, without delving into the field of machine learning. This strategy attempts to make a major contribution to the decrease in financial fraud and the security of online payments, offering a complete base for accomplishing these important goals.

2. Exploratory Data Analysis (EDA)：

An important stage of our project is EDA. We carefully investigate the properties of the dataset, looking at the distribution of both numerical and categorical features. Finding outliers, comprehending data correlations, and exposing patterns that might point to fraudulent transactions are the objectives of our research. The detailed analysis provided here guides the rest of our research.

3. Feature Engineering：

We use feature engineering to enhance our fraud detection skills. In order to extract pertinent information and increase the predictive power of our model, this process entails generating new features and transforming ones that already exist. The caliber of the features employed is frequently directly related to our model's efficacy. Furthermore, Logistic regression method is used to cross validate the trained data.

4. Analysis：

We also conduct statistical analysis in our research to look for anomalies, trends, and hidden patterns in the dataset. From the exploratory data analysis done, we use the classifers to seggregate the data and identify relevant patterns from the dataset. These revelations offer a deeper comprehension of the history and characteristics of online payment fraud. We hope to add to the corpus of knowledge on fraud detection with this analysis.

5. Results and Implications：

As we go along, we highlight the most important discoveries and learnings from our investigation in the results of our analysis. We assess the ramifications of our findings and their importance within the larger framework of fraud prevention and online payment security.

6. Recommendations：

We offer useful suggestions to improve online payment security and lower the possibility of fraud based on our analysis. These suggestions could include updated transaction policies, strengthened security protocols, or the use of more sophisticated fraud detection technologies.

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