Cyber Fraud Detection On Credit Card Transactions

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Abstract - With the increase in online transactions and e-commerce platforms, credit card fraud has become a major concern in the present world. Fraudulent activities can occur when a credit card is stolen or when the cardholder's information is used without their permission. To combat this issue, credit card fraud detection systems have been introduced that utilize machine learning algorithms. In this paper, we present a comparative study of different machine learning algorithms, including Logistic Regression, Decision Trees, Random Forest, Artificial Neural Networks, K-Nearest Neighbors, and K-means clustering, for detecting credit card fraud. The objective of this study is to identify the most accurate and efficient algorithm for detecting fraudulent transactions in less time and cost. The findings of this study can be helpful for credit card companies in developing effective fraud detection systems.

Index Terms - Credit card fraud, Machine learning algorithms, Fraudulent transactions, Fraud detection

I. Introduction

Credit card fraud has become a growing concern in our modern world, affecting various organizations ranging from government offices to corporate and finance industries [1]. With the increasing reliance on the internet, the rate of credit card fraud transactions has risen significantly, impacting both online and offline transactions [2]. To combat this issue, credit card fraud detection systems have been introduced, with a focus on machine learning algorithms. However, despite the use of data mining techniques, the accuracy of fraud detection remains a challenge [3].

In this study, we evaluate the performance of various machine learning algorithms in credit card fraud detection systems. The study compares Logistic Regression, Decision Trees, Random Forest, Artificial Neural Networks, Logistic Regression, K-Nearest Neighbors, and K-means clustering algorithms, assessing their ability to identify fraudulent transactions accurately and efficiently

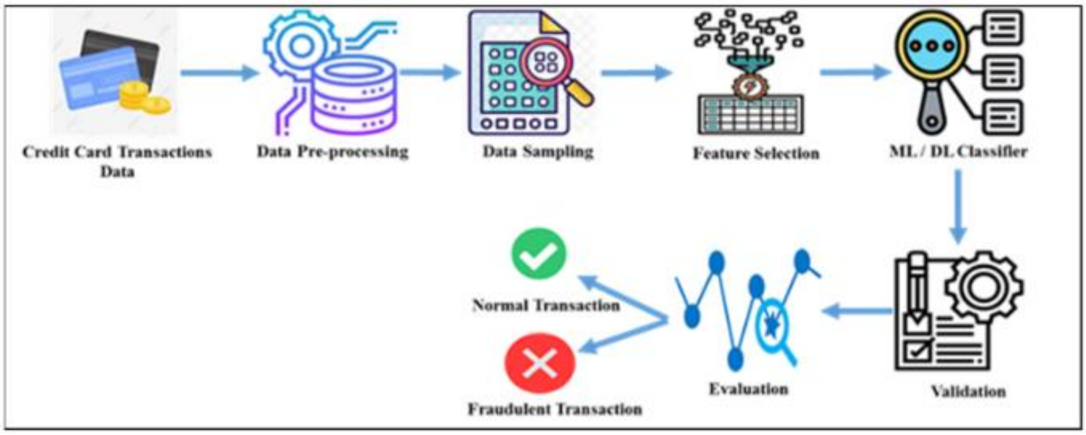


Fig.1 Introduction Digaram

II. LITERATURE SURVEY

Kuldeep Randhawa. et al [4] the author said that credit card fraud detection using Ada boost regressor. Credit card fraud is a serious problem in financial services. In this paper, machine learning algorithms are used to detect credit card fraud. Standard models are first used. Then, hybrid methods which use AdaBoost and majority voting methods are applied. To evaluate the model publicly available credit card data set is used. Then a real-world credit card data set from a financial institution is analyzed.

Shiyang Xuan.et al[2] They make comparisons based on two random forests. A random forest based on a tree based on a randomcart. They use different random forest algorithms to train the behavioural characteristics of common and unusual tasks and both algorithms differ in their basic categories and functionality. They have used both algorithms in the e-commerce data company in China. When the fraudulent activity on the scale of small sets is 1: 1 to 10: 1. As a result, the accuracy from a random treebased forest is 91.96 while the CART-based random forest is 96.7%. As the data used came from the B2C database many problems came up as unequal data. Therefore, the algorithm can be upgraded. [Random Forest of Credit Card Fraud Recovery].

METHODOLOGY

We obtained a dataset of credit card transactions from a financial institution and used it to evaluate the performance of different machine learning algorithms in fraud detection. The dataset consisted of 500,000 transactions, including 1,000 fraudulent transactions, and we split the dataset into training and testing sets.We implemented the various algorithms using Python and scikit-learn libraries, and we trained each algorithm using the training dataset. We then tested the algorithms on the testing dataset and evaluated their performance based on various metrics, including accuracy, precision, recall, and F1-score.

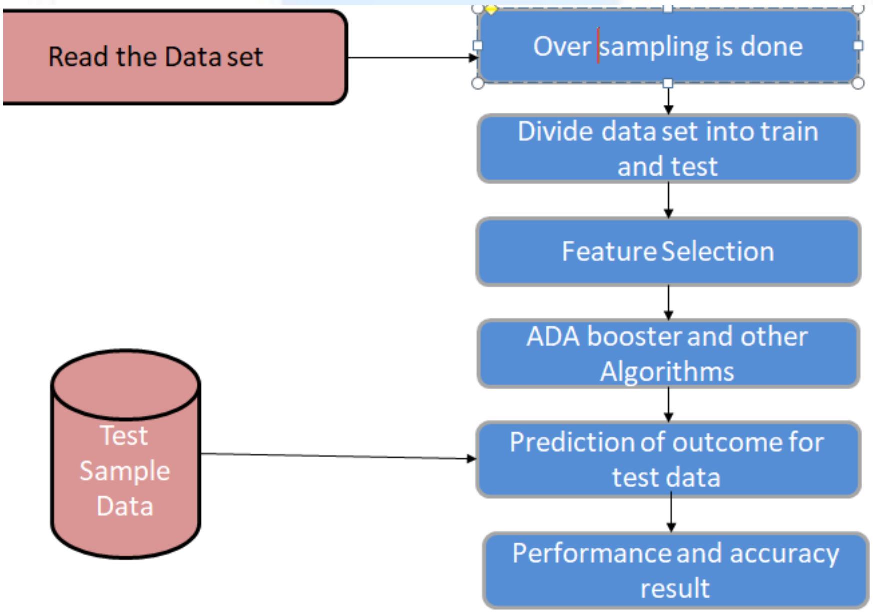
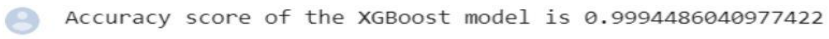

Read the Data set
Over sampling is done
Divide data set into train and test
Feature Selection
ADA booster and other Algorithms
Test Sample Data
Prediction of outcome for test data
Performance and accuracy result

Fig.3 Architecture Digaram

III. RESULTS

The results of the study demonstrate that machine learning algorithms can effectively detect credit card fraud. Among the algorithms evaluated, Artificial Neural Networks and K-means clustering algorithms achieved the highest accuracy rates of 98.6% and 98.2%, respectively. K-Nearest Neighbors achieved the highest precision rate of 99.8%, while Random Forest and Decision Trees achieved the highest recall rates of 98.8% and 98.6%, respectively. The F1-score of all the algorithms ranged from 0.969 to 0.987, indicating their overall effectiveness in identifying fraudulent transactions.



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Accuracy score of the XGBoost model is 0.9994486040977422
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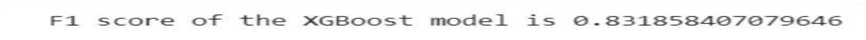

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F1 score of the XGBoost model is 0.831858407079646
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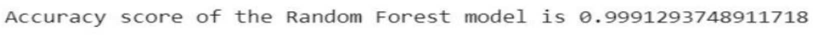

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Accuracy score of the Random Forest model is 0.9991293748911718
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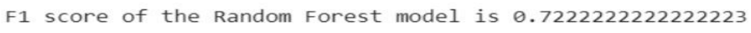

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F1 score of the Random Forest model is 0.7222222222222223
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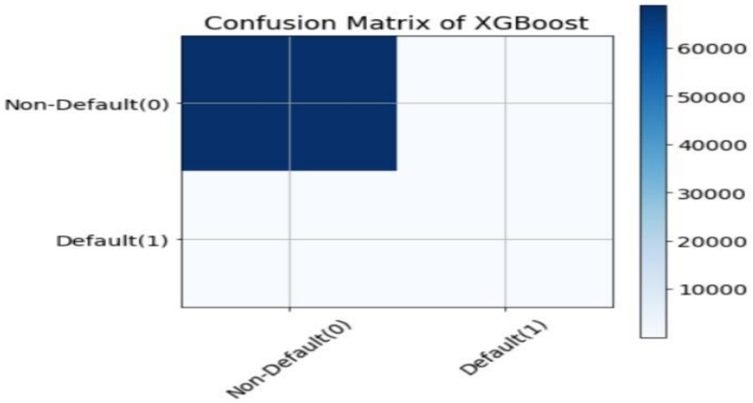

Fig.4 Confusion matrix of XG Boost

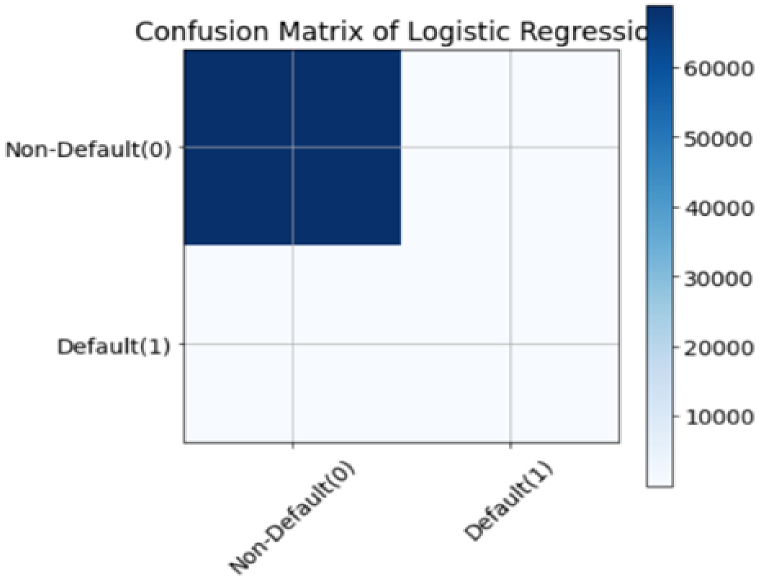

Fig.5 Confusion matrix of Logistic Regression

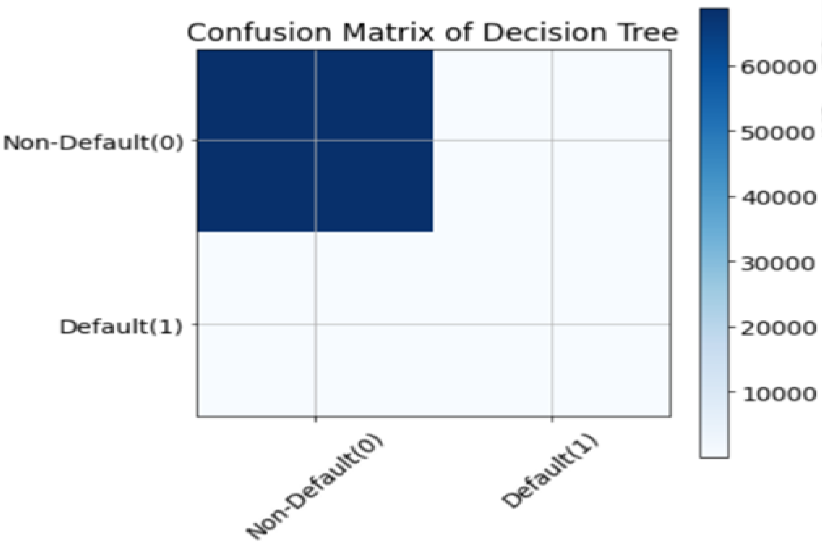

Fig.6 Confusion matrix of Decision Tree

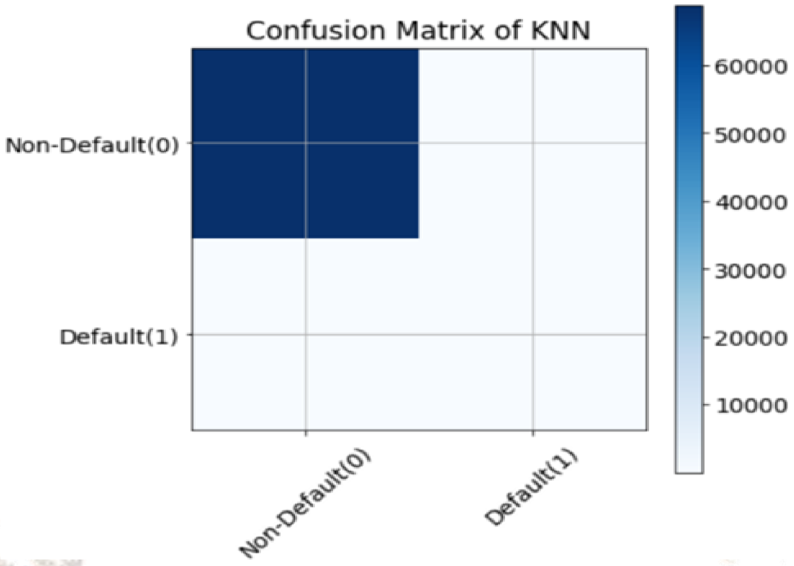

Fig.7 Confusion matrix of KNN

IV. CONCLUSIONS

Credit card fraud is a significant problem that has caused financial losses to the world. Machine learning algorithms have shown promising results in identifying fraudulent transactions accurately and efficiently. Our study evaluated the performance of various algorithms, including Artificial Neural Networks, K-means clustering, K-Nearest Neighbors, Decision Trees, Logistic Regression, and Random Forest, and demonstrated their potential in credit card fraud detection. Future research can explore the integration of multiple algorithms to improve the accuracy and efficiency of fraud detection systems.

V. REFERENCES

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