



# Credit Card Fraud Detection Using Machine Learning



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## • Introduction

Credit card fraud is a growing concern in the present world with the growing fraud in the government offices, corporate industries, financial industries and many other organizations. Credit card fraud detection is the process of identifying and preventing unauthorized or fraudulent transactions made using credit cards. This is done using a combination of rule-based systems, machine learning algorithms, and real-time monitoring to analyze transaction patterns and detect suspicious activities.

## • Objectives

- Detect Fraudulent Transactions
- Handle Imbalanced Data
- Minimize False Positives
- Improve Fraud Detection Accuracy
- Increase Security in Online Payments
- Reduce Financial Losses

## • Algorithm

### Logistic Regression

- Uses a sigmoid function to classify transactions as fraud or not.
- Simple and fast, but struggles with complex fraud patterns.

### Random Forest

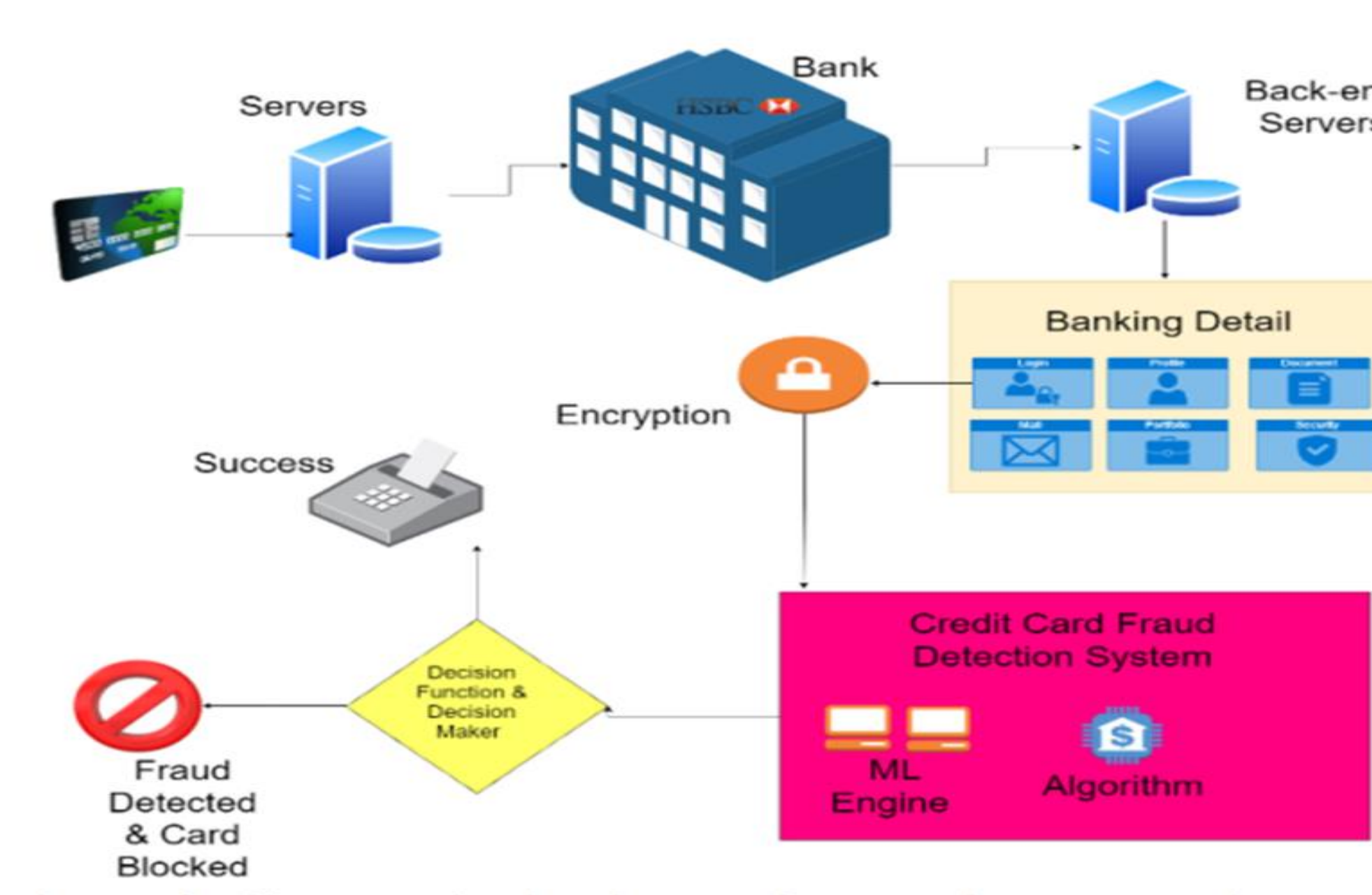
- Builds multiple decision trees and combines predictions for better accuracy.
- Works well with imbalanced fraud datasets, reducing overfitting.

## • Dataset

- The dataset contains transactions made by credit cards in September 2013 by European cardholders.
- This dataset presents 284,807 transactions.
- It contains only numerical input variables which are the result of a PCA transformation.
- The only features which have not been transformed with PCA are 'Time' and 'Amount'.

## • Methodology

- Data Collection.
- Preprocessing
- Handling Imbalance .
- Feature Selection.
- Model Training .
- Model Evaluation.
- Fraud Detection & Deployment .



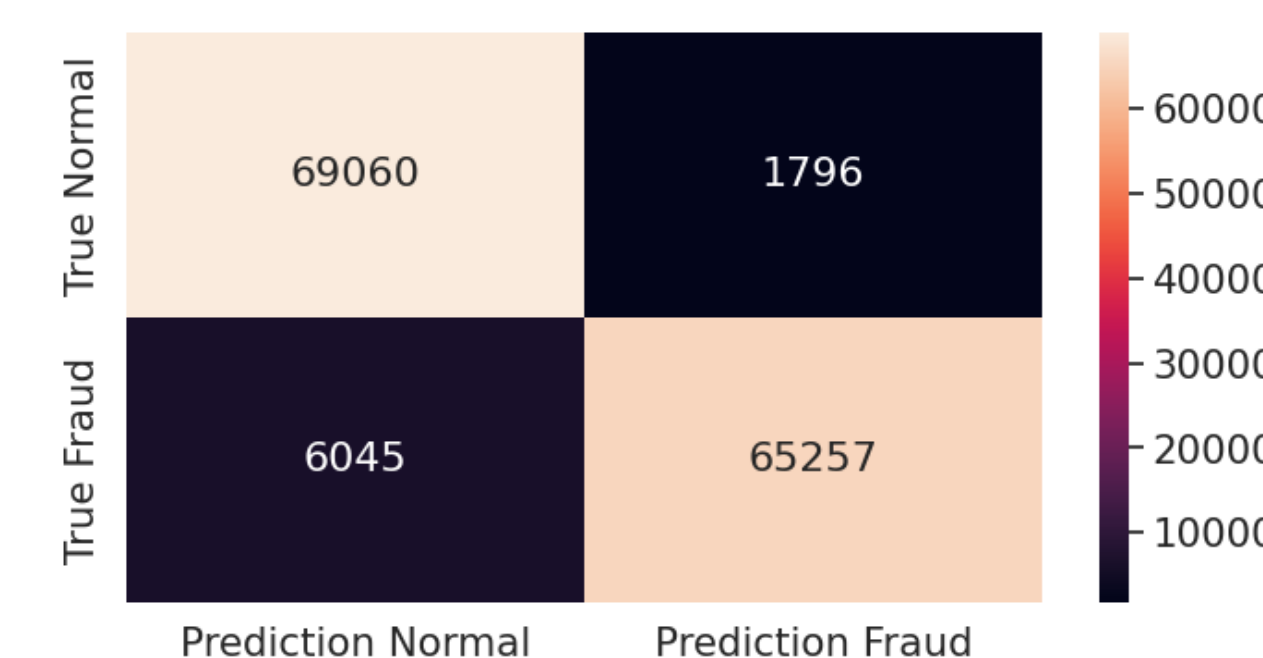
## • Result

### Logistic Regression

precision recall f1-score support

0	0.92	0.97	0.95	70856
1	0.97	0.92	0.94	71302

accuracy	0.94	142158		
macro avg	0.95	0.94	0.94	142158
weighted avg	0.95	0.94	0.94	142158

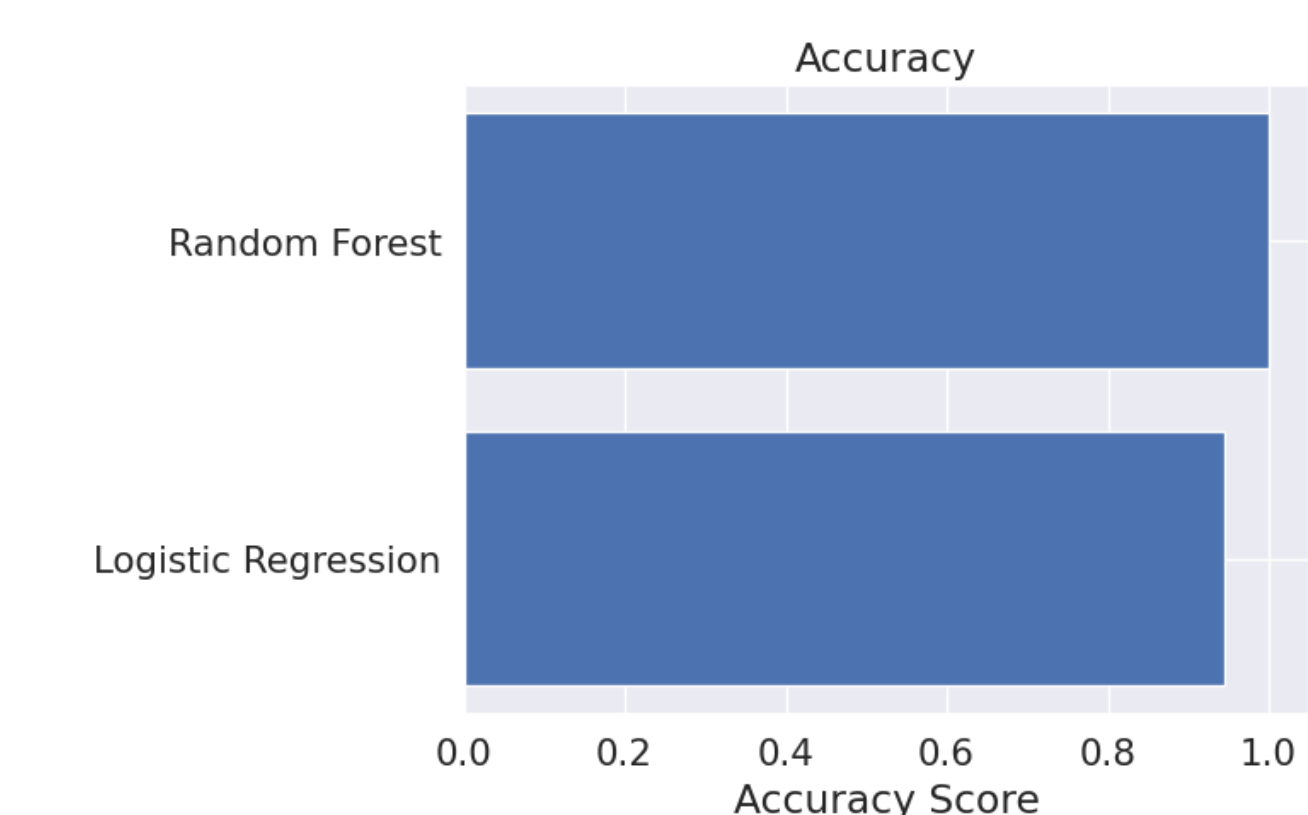
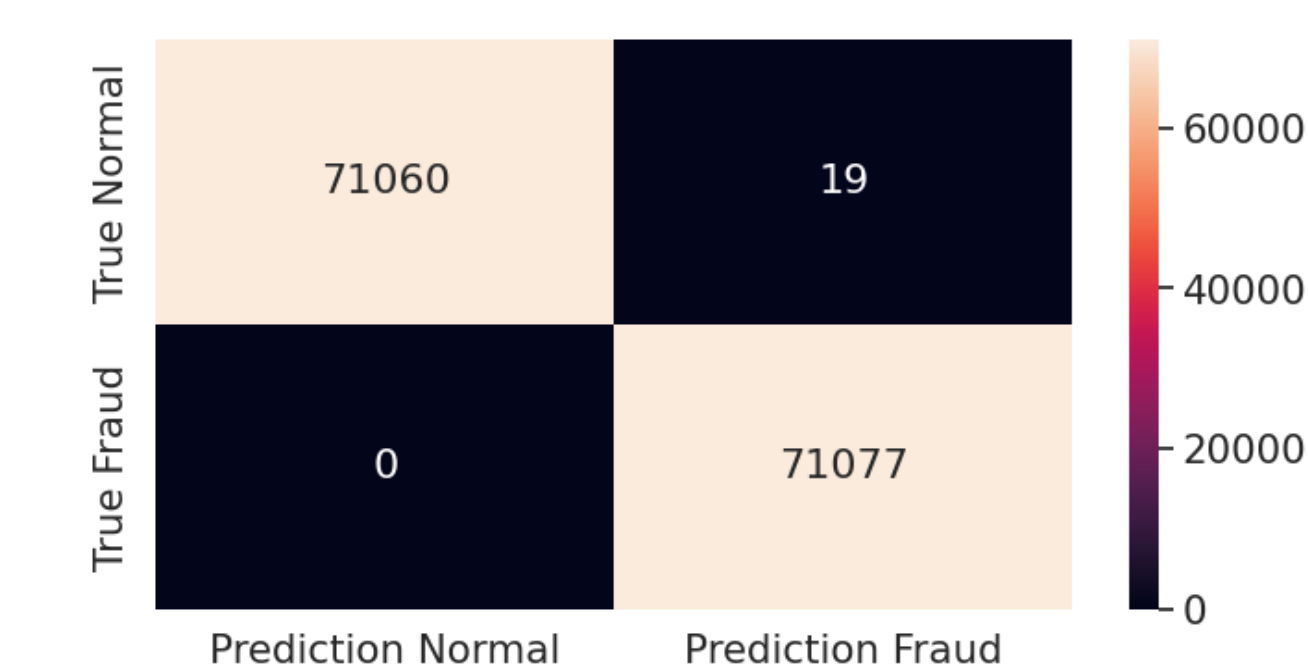


### Random Forest Classifier

precision recall f1-score support

0	1.00	1.00	1.00	71079
1	1.00	1.00	1.00	71077

accuracy	1.00	142156		
macro avg	1.00	1.00	1.00	142156
weighted avg	1.00	1.00	1.00	142156



## • Future work

- Improving model performance & accuracy
- Adapting to emerging fraud techniques
- Blockchain & Federated Learning for secure transactions
- Explainable AI for Fraud Investigation
- Integration with advanced cybersecurity measures

## • Reference

- [1]Mohammed, Emad, and Behrouz Far. "Supervised Machine Learning Algorithms for Credit Card Fraudulent Transaction Detection: A Comparative Study." IEEE Annals of the History of Computing, IEEE, 1 July 2018, doi.ieeecomputersociety.org/10.1109/IRI.2018.00025.
- [2] S. W. L. F. Lima, H. A. K. Viana, and A. C. M. Pereira, "A machine learning approach for credit card fraud detection," in *Proceedings of the 2018 IEEE International Joint Conference on Neural Networks (IJCNN)*, Rio de Janeiro, Brazil, 2018, pp. 1–8. DOI: 10.1109/IJCNN.2018.8489334.