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Fraud Detection Project

By: G-1 Team

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Outlines:

- Project Overview
- Data Analysis and Visualization
- Predictive Model
  - Logistic Regression model
  - RF model
  - XG Boost model
  - Neural Network
- Model Deployment
- Conclusion

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Project Overview

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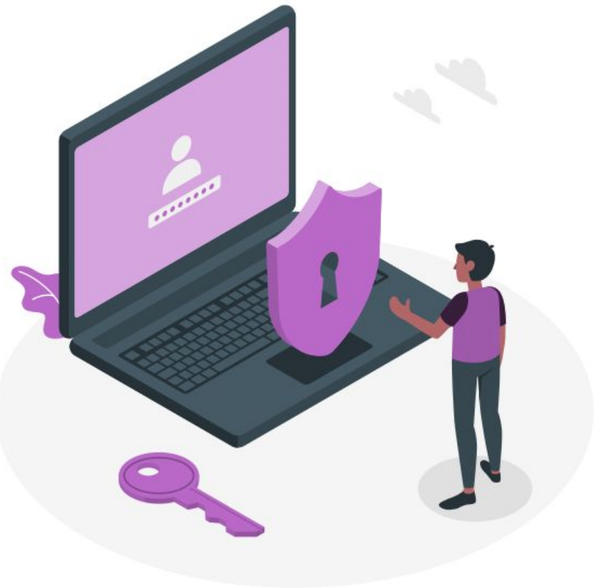
Problem Statement

Detect fraudulent credit card transactions using a dataset containing information about transactions made by European cardholders over two days.



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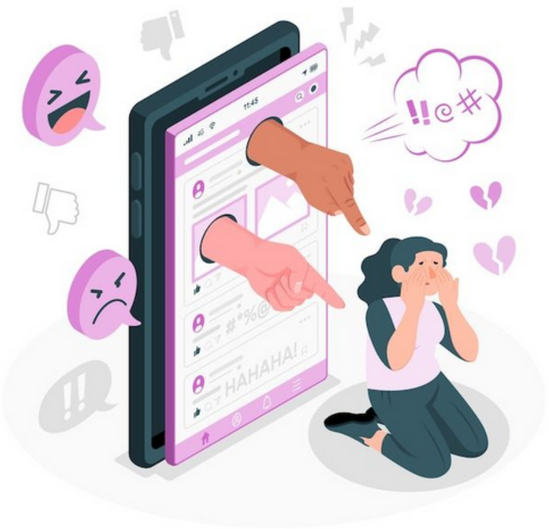
Goal

The primary goal of this project is to design and implement a robust machine learning model to reduces false alarms while effectively identifying instances of fraud. The ultimate objective is to provide financial institutions with a dependable tool to enhance fraud prevention strategies and safeguard customers' financial security.



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Dataset

The dataset contains credit card transaction records from September 2013, featuring 284,807 transactions. Within this dataset, only 492 instances (0.172%) represent fraudulent activities, making it highly imbalanced.

	Time	V1	V2	V3	V4	V5	V6	V7	V8	V9	...	V21	V22	V23
0	0.0	-1.359807	-0.072781	2.536347	1.378155	-0.338321	0.462388	0.239599	0.098698	0.363787	...	-0.018307	0.277838	-0.110474
1	0.0	1.191857	0.266151	0.166480	0.448154	0.060018	-0.082361	-0.078803	0.085102	-0.255425	...	-0.225775	-0.638672	0.101288
2	1.0	-1.358354	-1.340163	1.773209	0.379780	-0.503198	1.800499	0.791461	0.247676	-1.514654	...	0.247998	0.771679	0.909412
3	1.0	-0.966272	-0.185226	1.792993	-0.863291	-0.010309	1.247203	0.237609	0.377436	-1.387024	...	-0.108300	0.005274	-0.190321
4	2.0	-1.158233	0.877737	1.548718	0.403034	-0.407193	0.095921	0.592941	-0.270533	0.817739	...	-0.009431	0.798278	-0.137458
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
284802	172786.0	-11.881118	10.071785	-9.834783	-2.066656	-5.364473	-2.606837	-4.918215	7.305334	1.914428	...	0.213454	0.111864	1.014480
284803	172787.0	-0.732789	-0.055080	2.035030	-0.738589	0.868229	1.058415	0.024330	0.294869	0.584800	...	0.214205	0.924384	0.012463
284804	172788.0	1.919565	-0.301254	-3.249640	-0.557828	2.630515	3.031260	-0.296827	0.708417	0.432454	...	0.232045	0.578229	-0.037501
284805	172788.0	-0.240440	0.530483	0.702510	0.689799	-0.377961	0.623708	-0.686180	0.679145	0.392087	...	0.265245	0.800049	-0.163298
284806	172792.0	-0.533413	-0.189733	0.703337	-0.506271	-0.012546	-0.649617	1.577006	-0.414650	0.486180	...	0.261057	0.643078	0.376777

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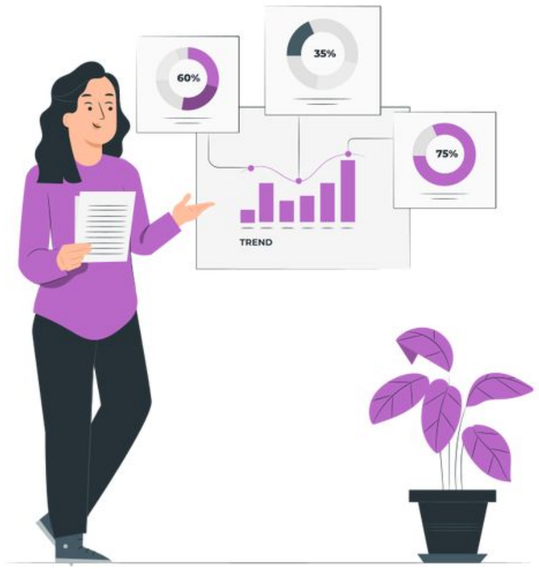
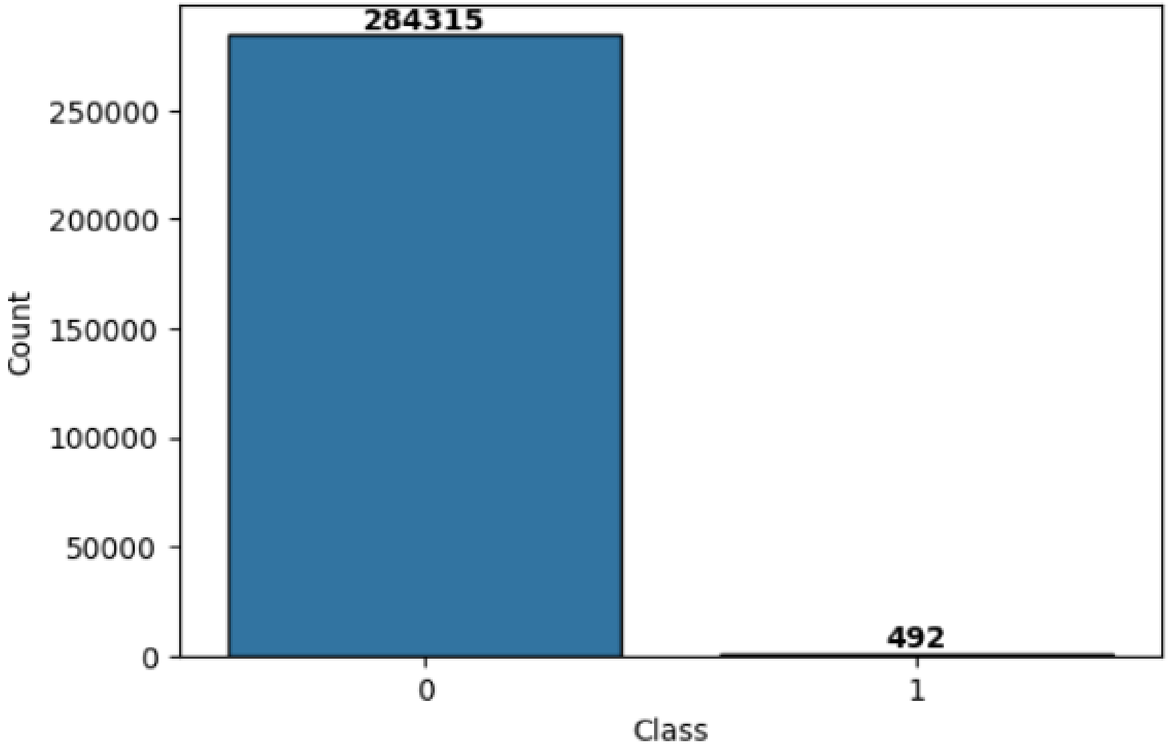
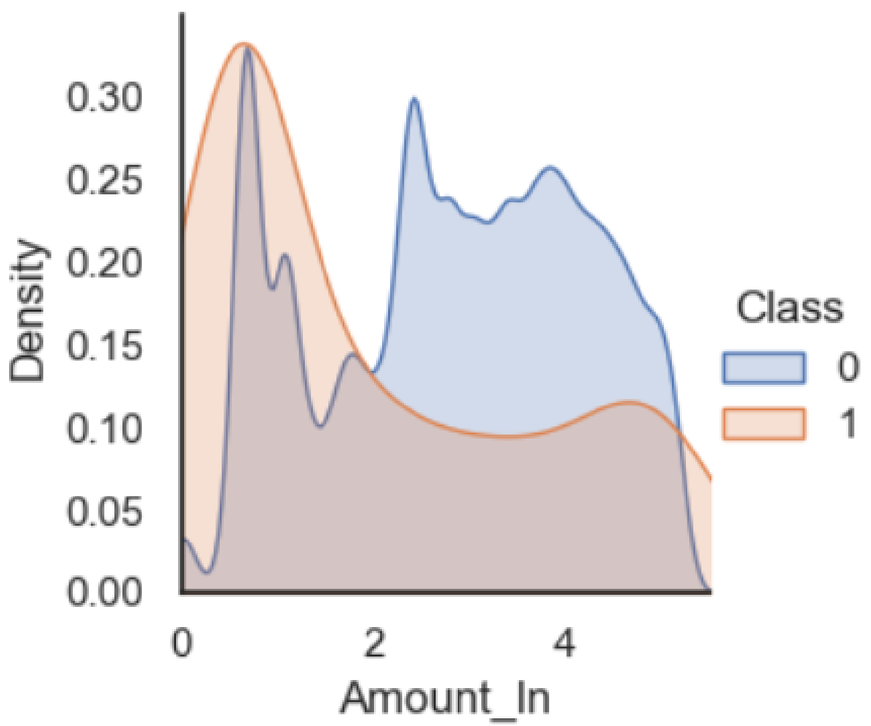
Data Analysis and Visualization

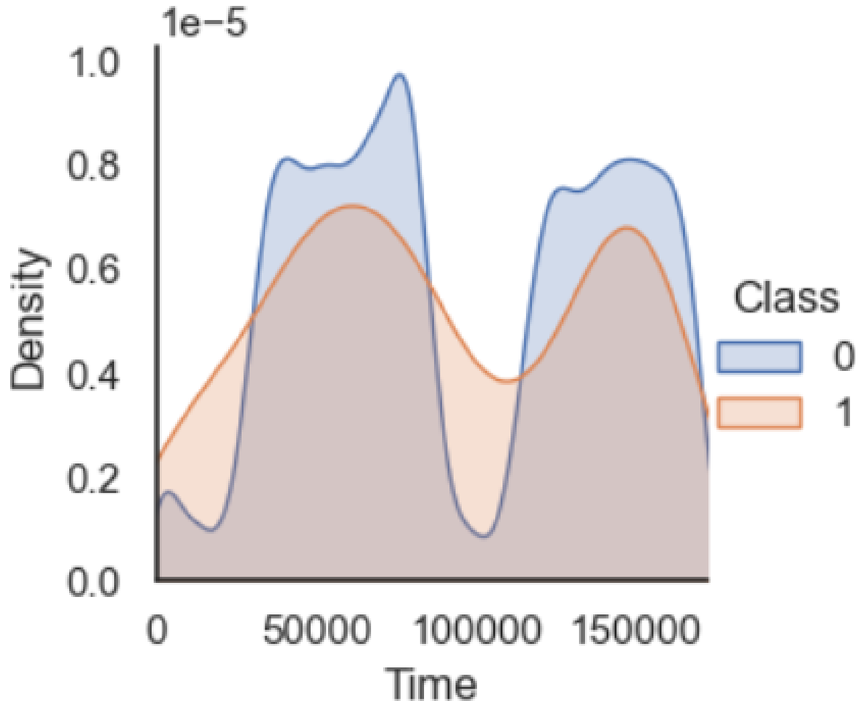


Fraud distribution

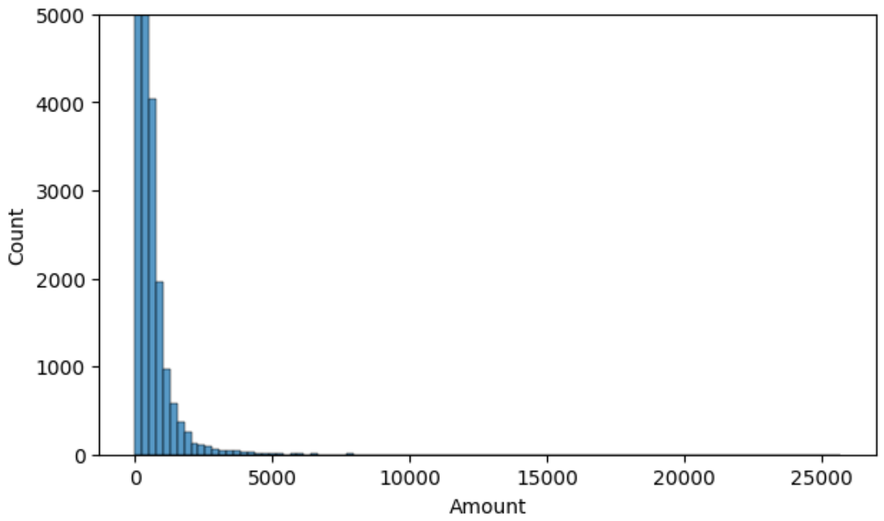


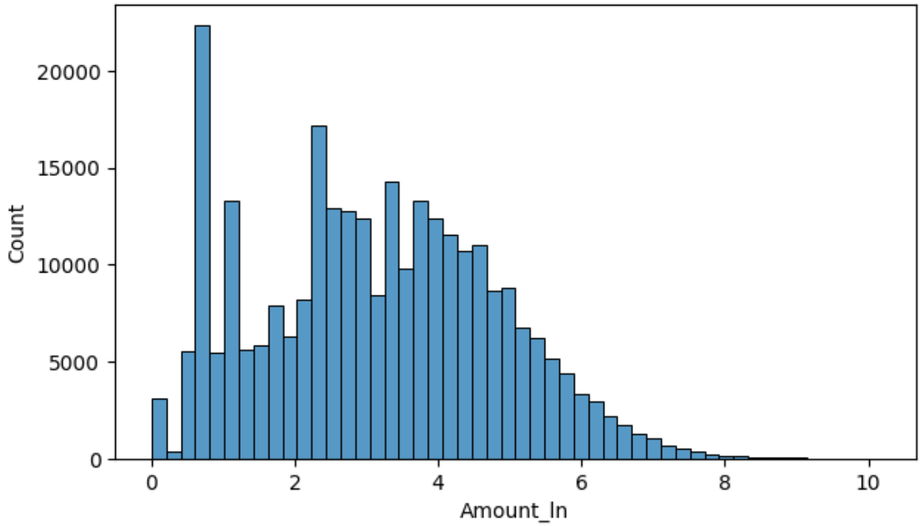
Kernel Density Estimation of Transformed Features (Amount and Time)



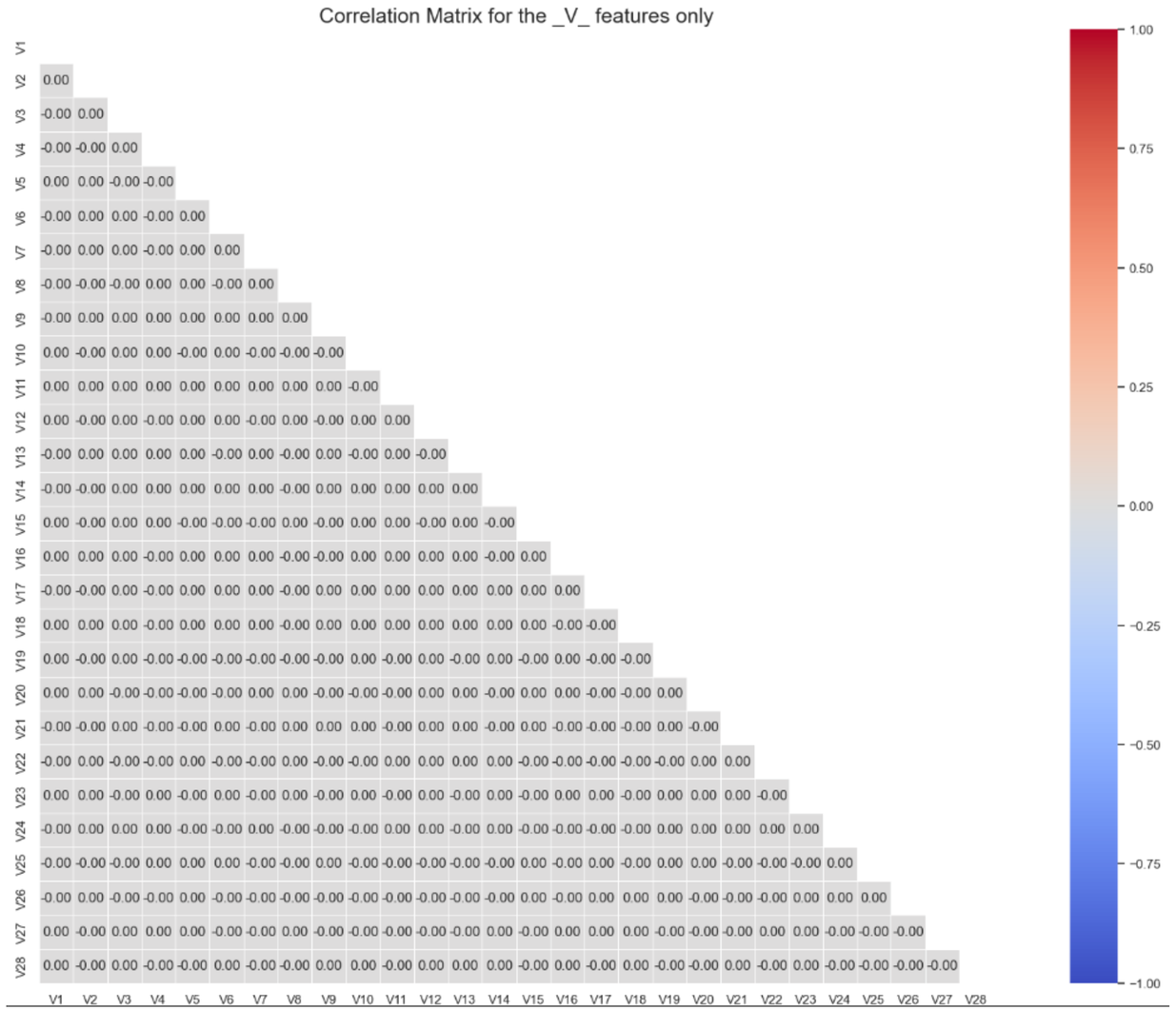


Amount before and after transformation

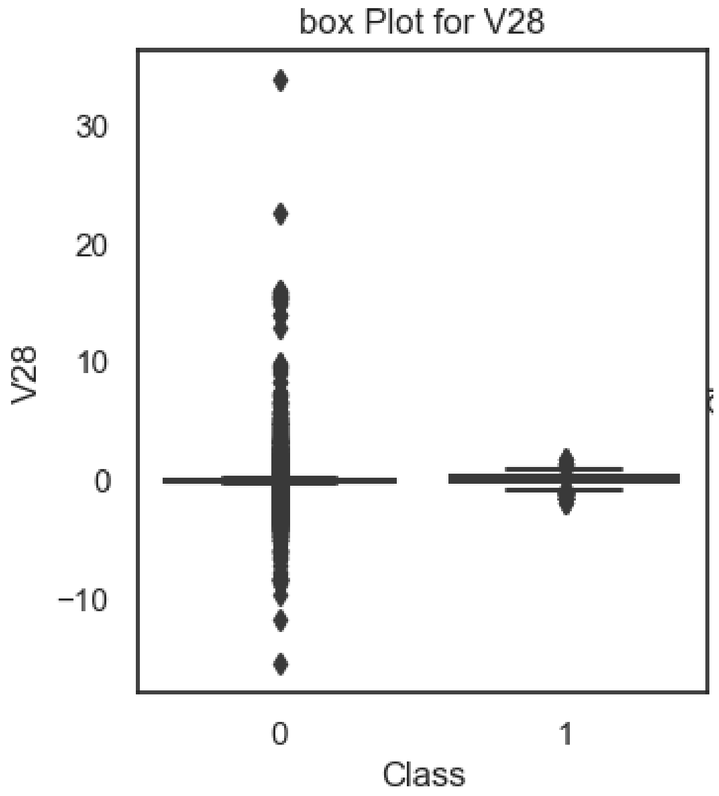


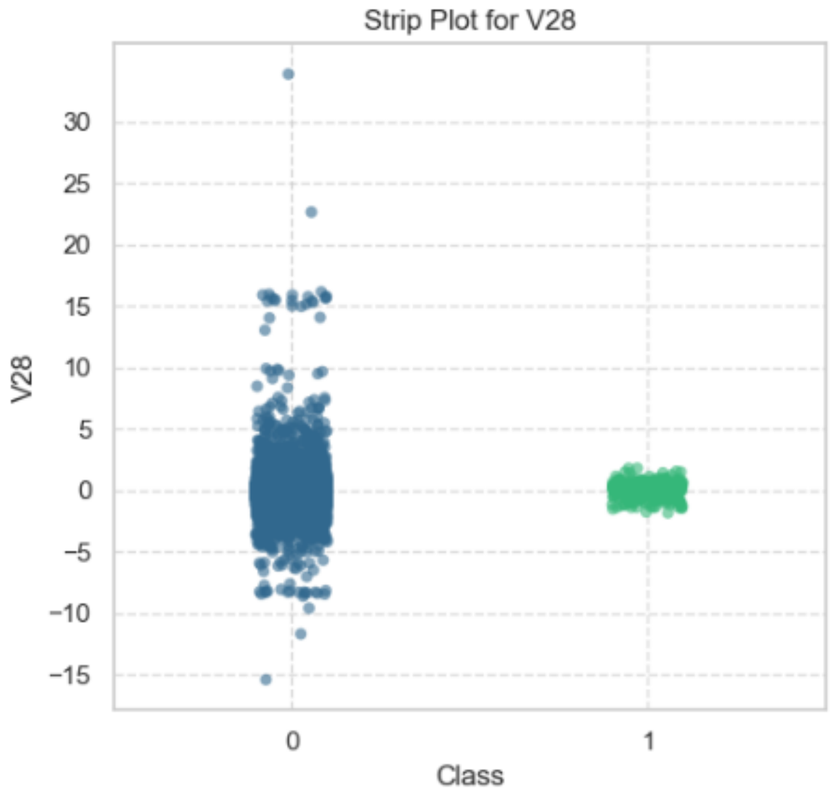


Features Correlation



Are they outliers?





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Predictive Model

Over/Under Sampling

```
# For resampling"

under_class0 = int(y_train.value_counts()[0] - (0.2 * y.value_counts()[0]))
over_class1 = int(y_train.value_counts()[1] + (0.2 * y.value_counts()[1]))
```

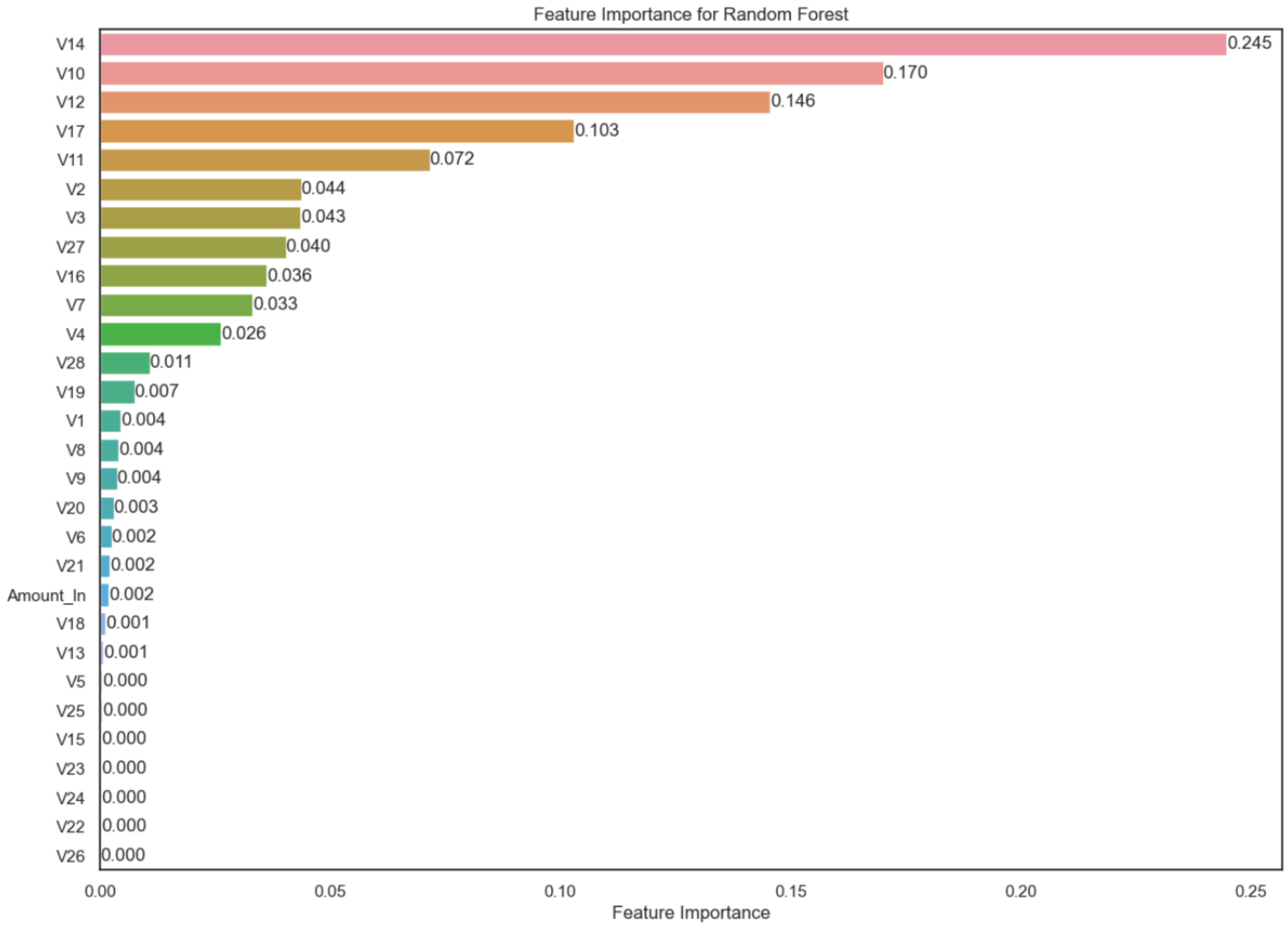
```
Original X_train distribution: Class
0    220079
1       378
Name: count, dtype: int64
--------------------
Resampled X_train distribution: Class
0    165059
1       472
Name: count, dtype: int64
```

Predictive Model Building

Classification algorithms we applied:

1. Logistic Regression
2. Random Forest Classifier
3. XGBoost Classifier
4. Neural Network

Features Importance for the Best Model



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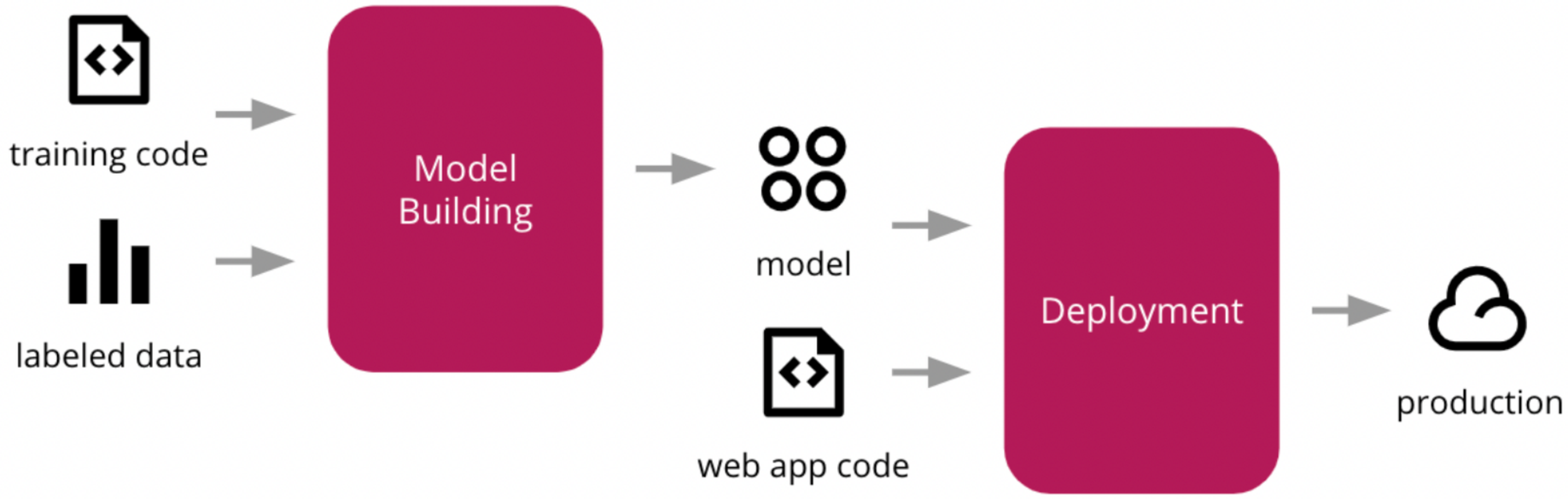
Model Deployment

What is Model Deployment?

Deployment means putting a machine learning model into action in a real business setting to make decisions based on data. It's one of the last steps in the machine learning process. In this project we deployed our ML model with Streamlit on AWS.



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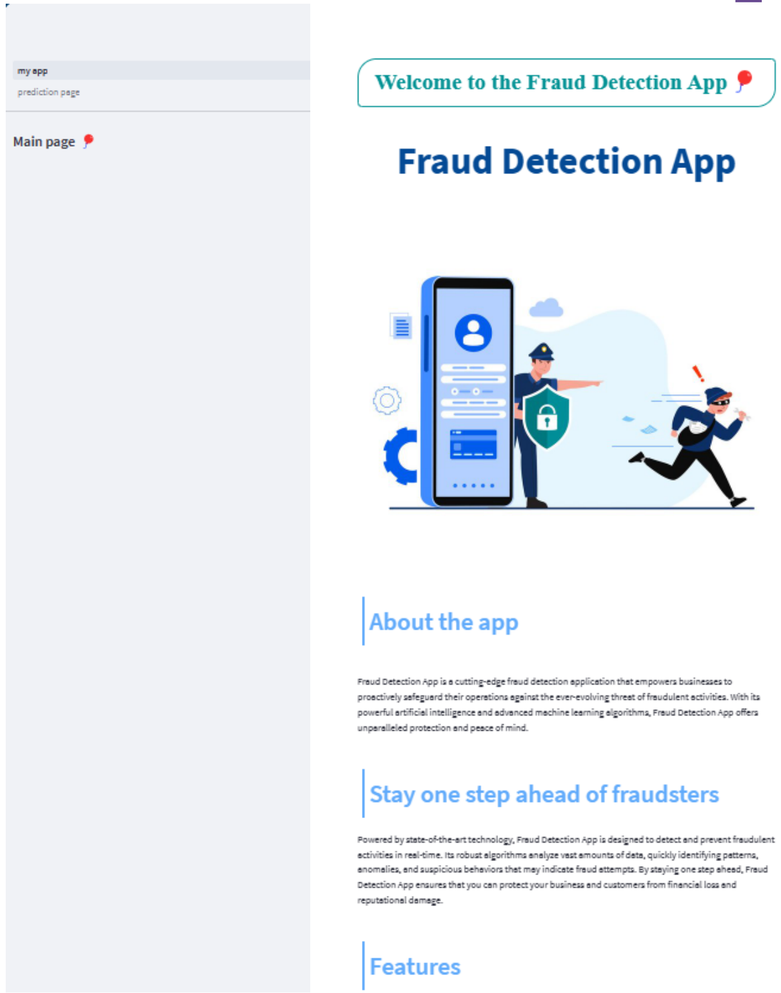
Fraud Detection App



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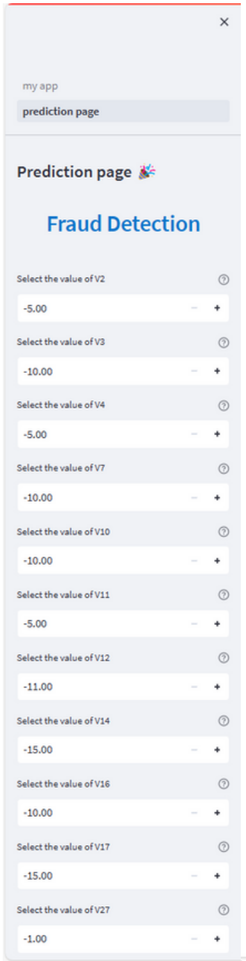
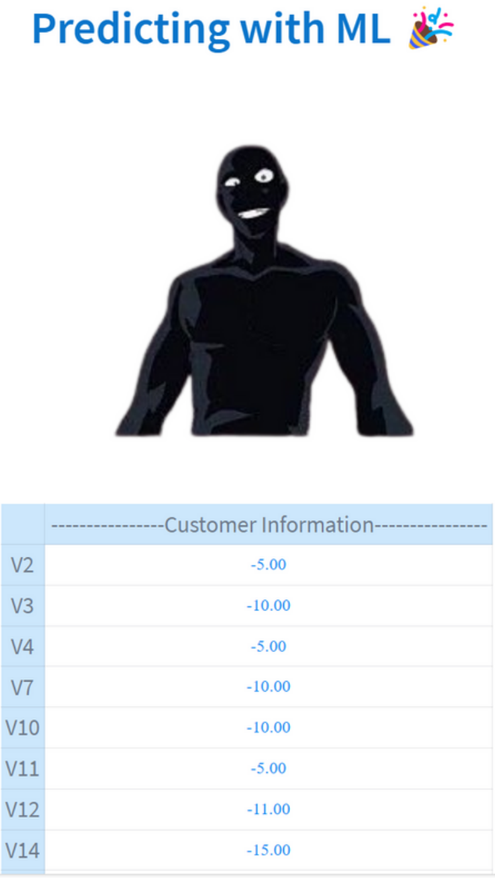
Fraud Detection App





	----------Customer Information----------
V2	-5.00
V3	-10.00
V4	-5.00
V7	-10.00
V10	-10.00
V11	-5.00
V12	-11.00
V14	-15.00

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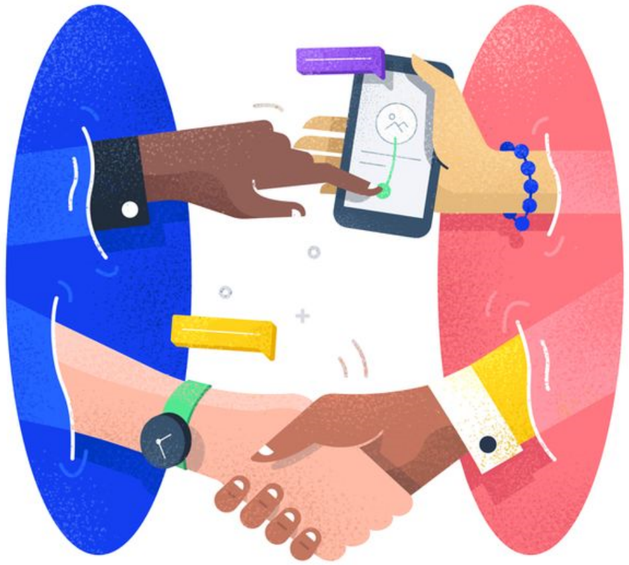

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Conclusion

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In this project, we deploy a Streamlit app that detects transaction Fraud based on user inputs. The app loads a trained Random Forest classifier model and applies it to the user input data to detect whether or not the transactions is likely to Fraud.

Thanks for Listening