Artifacts

Data Understanding

Data Understanding

	Time	V1	V2	V3	V4	V5	V6	V7	V8	V9	...	V21	V22	V23	V24	V25	V2
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	0.066928	0.128539	-0.18911
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	-0.339846	0.167170	0.12589
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	-0.689281	-0.327642	-0.13909
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	-1.175575	0.647376	-0.22192
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	0.141267	-0.206010	0.50229

Exploratory Data Analysis

Exploratory Data Analysis (EDA)

Distribution of Classes

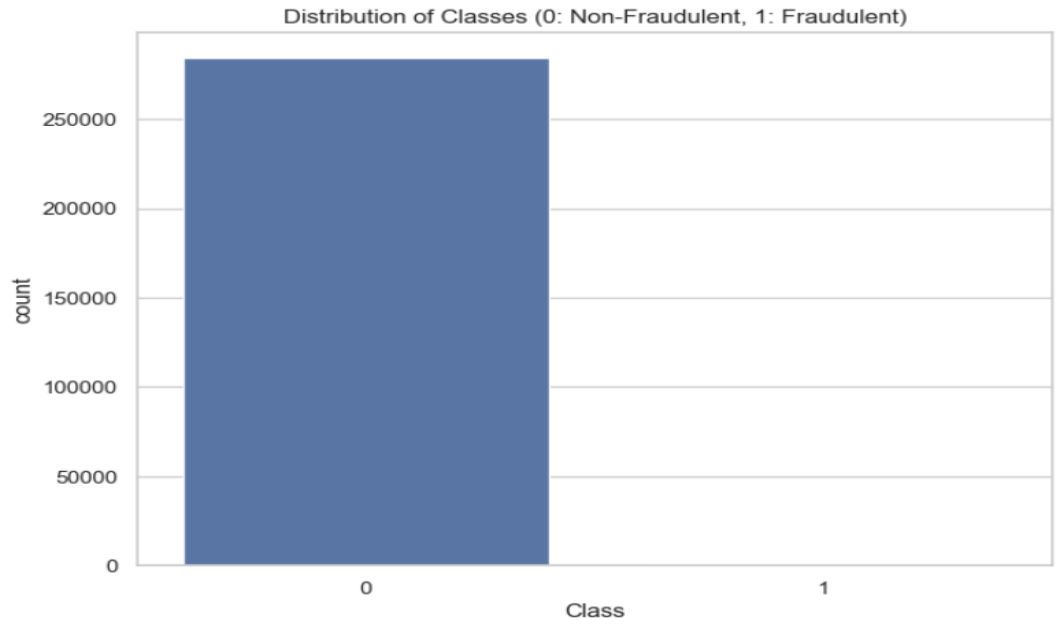


Figure 2 Distribution of Classes

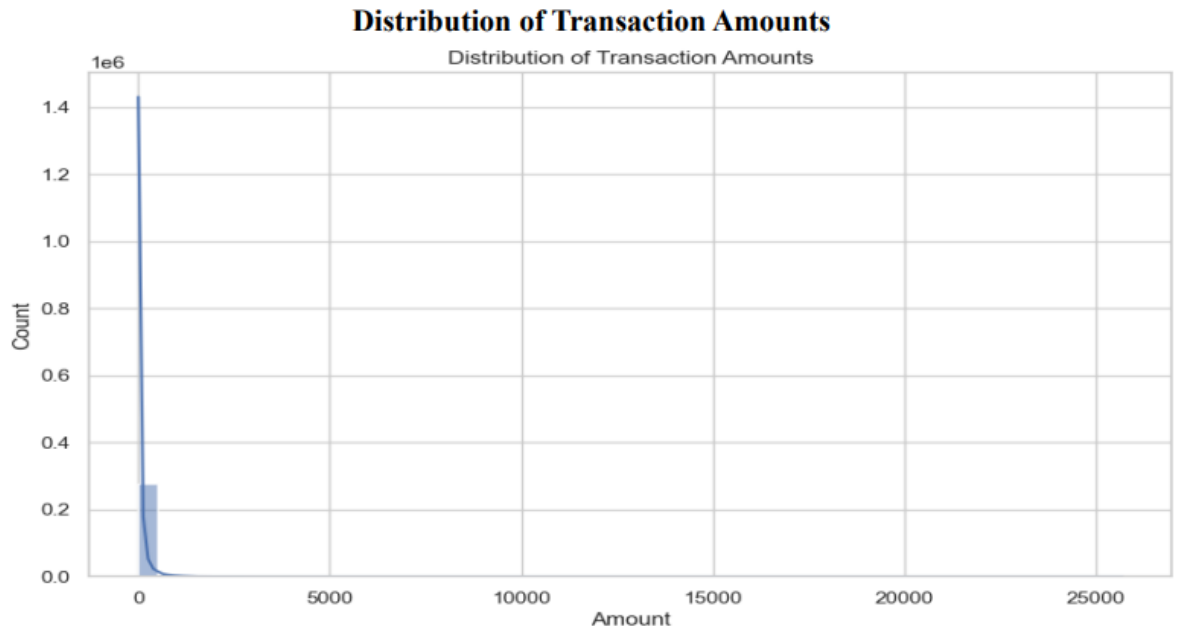
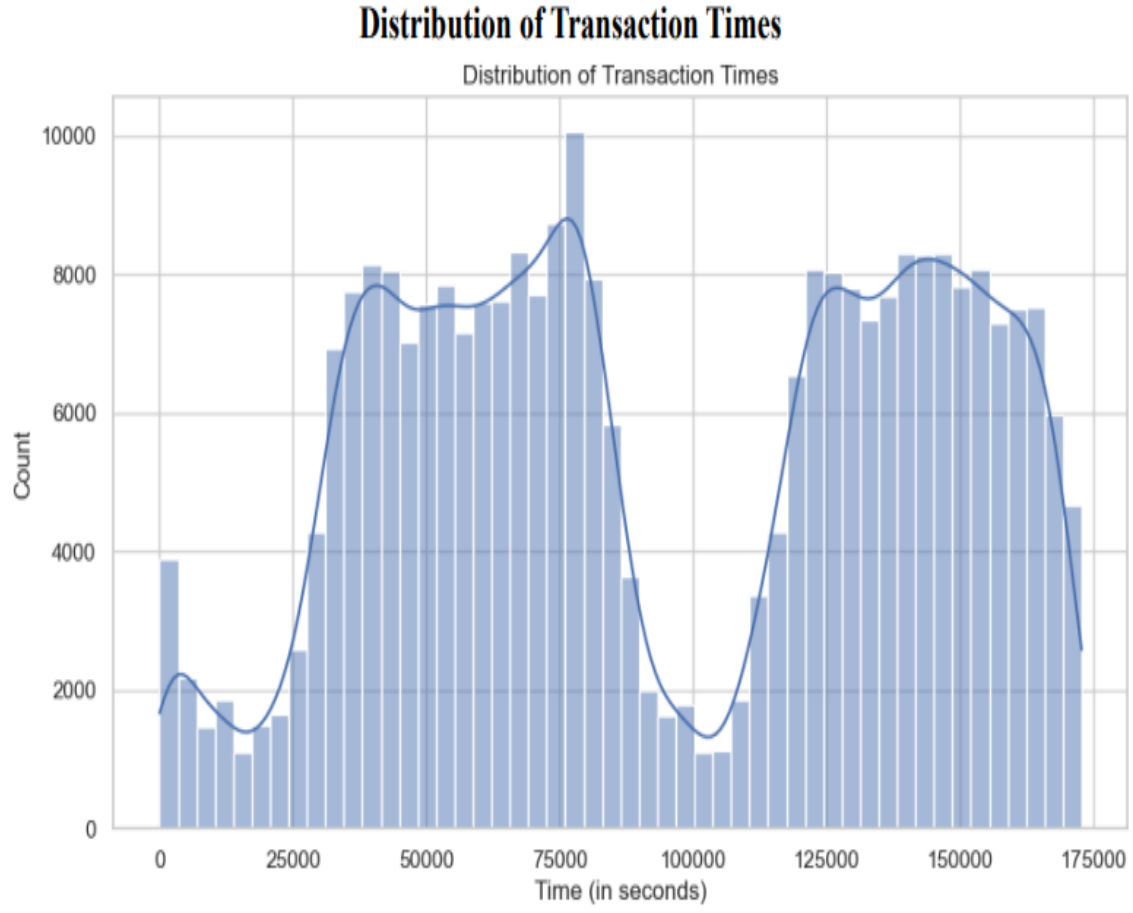


Figure 3 Distribution of Transaction Amounts



Correlation Matrix Heatmap

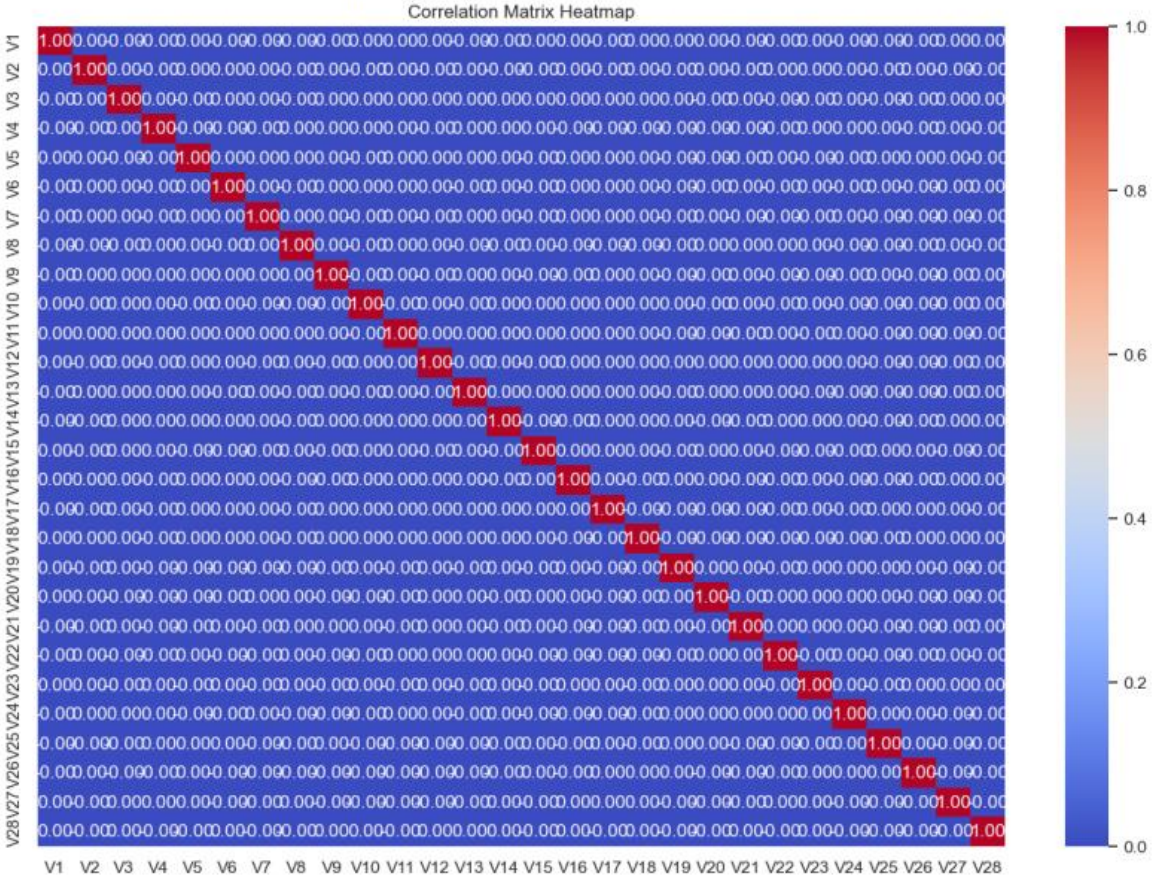


Figure 5 Correlation Matrix Heatmap

Naïve Bayes Classifier

$$P(A/B) = \frac{P(A \cap B)}{P(B)} \qquad \text{-- equation 1}$$

$$P(B/A) = \frac{P(A \cap B)}{P(A)} \qquad \text{-- equation 2}$$

From equation 1 and 2 on equating for expression of P(A∩B)

$$P(A/B) * P(B) = P(B/A) * P(A)$$

$$P(A/B) = \frac{P(B/A) * P(A)}{P(B)} \qquad \text{--- Bayes Theorem}$$

```
▾ GaussianNB
GaussianNB()
```

Figure 6 Naive Bayes model

```
Accuracy: 0.9930128857835048

Confusion Matrix:
 [[56502   362]
 [   36    62]]

Classification Report:
              precision    recall  f1-score   support

           0       1.00      0.99      1.00     56864
           1       0.15      0.63      0.24        98

    accuracy                           0.99     56962
   macro avg       0.57      0.81      0.62     56962
weighted avg       1.00      0.99      1.00     56962
```

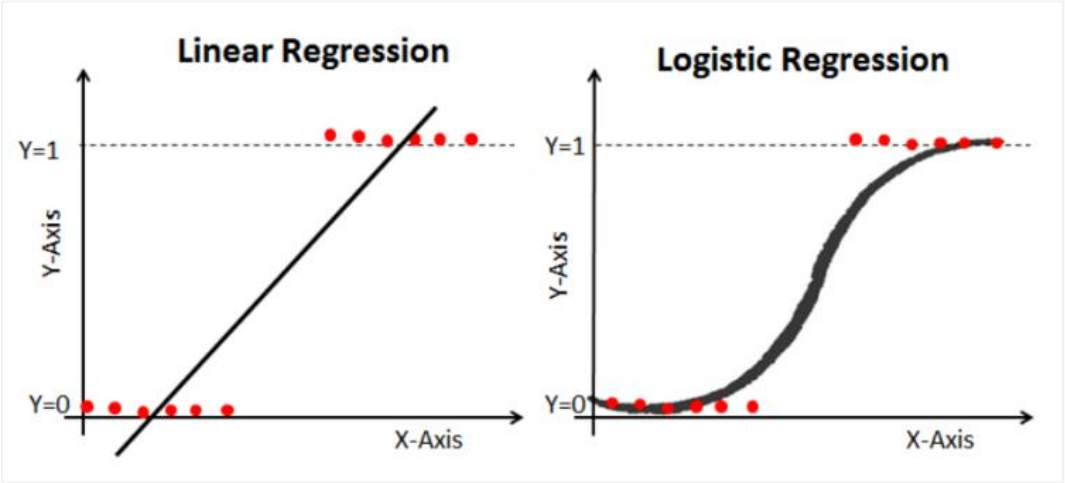
Figure 7 Classification Report of Naive Bayes

```
The transaction is predicted as NON-FRAUDULENT.
```

Figure 8 Prediction of Naive Bayes

```
▾ LogisticRegression
LogisticRegression(random_state=42)
```

Logistic Regression



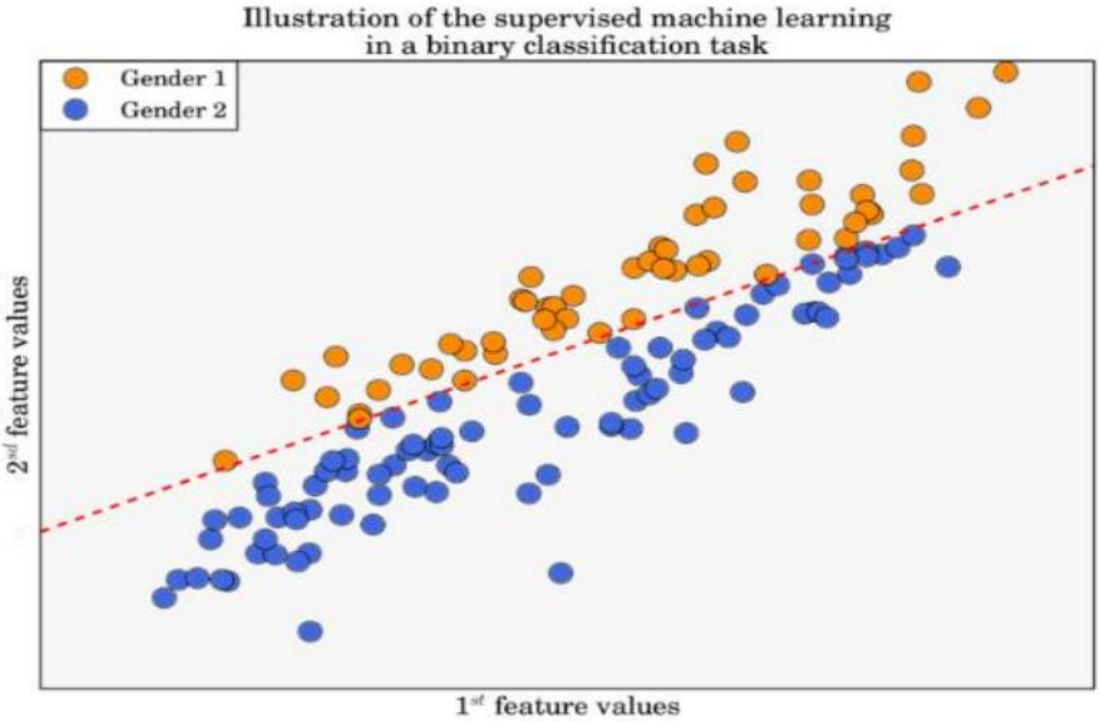


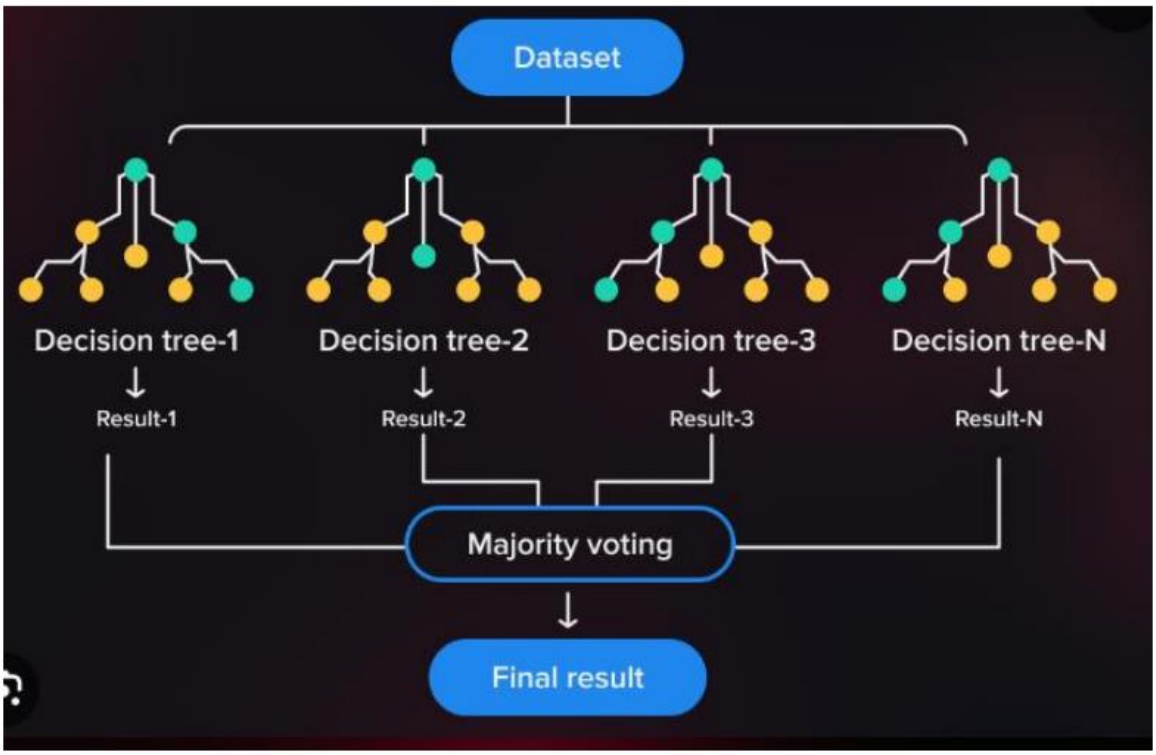
Figure 9 Logistic Regression

```
Accuracy: 0.9986657771847899

Confusion Matrix:
 [[56831    33]
 [   43    55]]

Classification Report:
              precision    recall  f1-score   support

           0       1.00      1.00      1.00     56864
           1       0.62      0.56      0.59        98

    accuracy                           1.00     56962
   macro avg       0.81      0.78      0.80     56962
weighted avg       1.00      1.00      1.00     56962
```

Figure 10 Classification Report of Logistic Regression

```
The transaction is predicted as NON-FRAUDULENT.
```

Random Forest Classifier



Random forest Classifier

Figure 11 Prediction of Logistic Regression

```
▾ RandomForestClassifier
RandomForestClassifier(random_state=42)
```

Figure 12 Random Forest Model

```
Accuracy: 0.9995611109160493

Confusion Matrix:
 [[56862     2]
 [   23    75]]

Classification Report:
              precision    recall  f1-score   support

           0       1.00      1.00      1.00     56864
           1       0.97      0.77      0.86        98

    accuracy                           1.00     56962
   macro avg       0.99      0.88      0.93     56962
weighted avg       1.00      1.00      1.00     56962
```

Figure 13 Classification Report of Random Forest

```
The transaction is predicted as NON-FRAUDULENT.
```

Figure 14 Prediction of Random Forest

Stacking Classifier

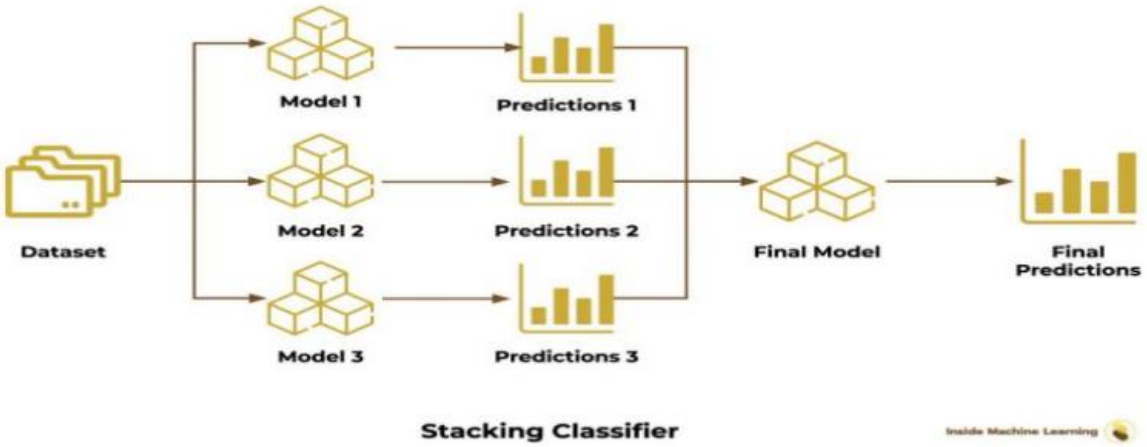


Figure 15 Stacking Classifier Model

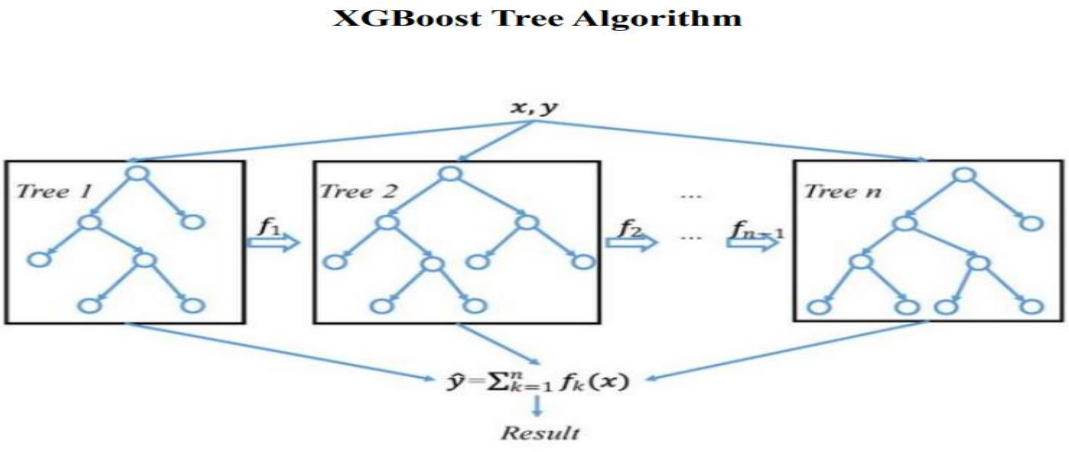
```
Accuracy: 0.9995084442259752

Confusion Matrix:
 [[56863     1]
 [   27    71]]

Classification Report:
              precision    recall  f1-score   support

           0       1.00      1.00      1.00     56864
           1       0.99      0.72      0.84        98

    accuracy                           1.00     56962
   macro avg       0.99      0.86      0.92     56962
weighted avg       1.00      1.00      1.00     56962
```

Figure 16 Classification Report of Stacking Classifier

```
The transaction is predicted as NON-FRAUDULENT.
```

Figure 17 Prediction of Stacking Classifier

xgboost



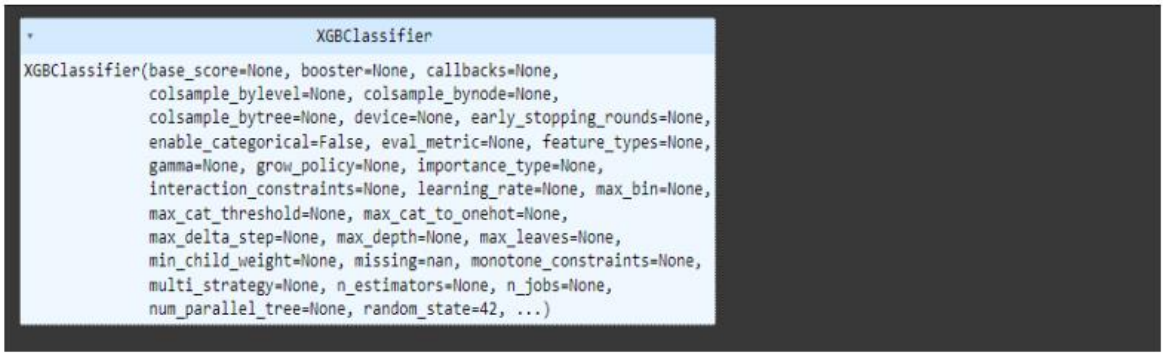


Figure 18 Xgboost Model

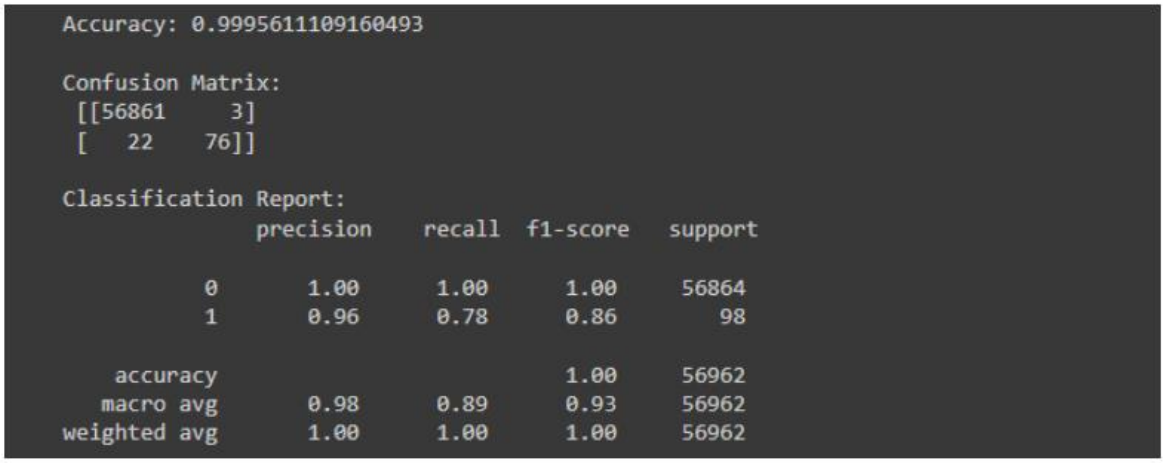


Figure 19 Classification Report of Xgboost

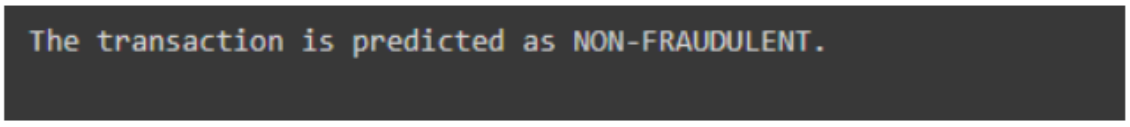


Figure 20 Prediction of Xgboost

All models Accuracy

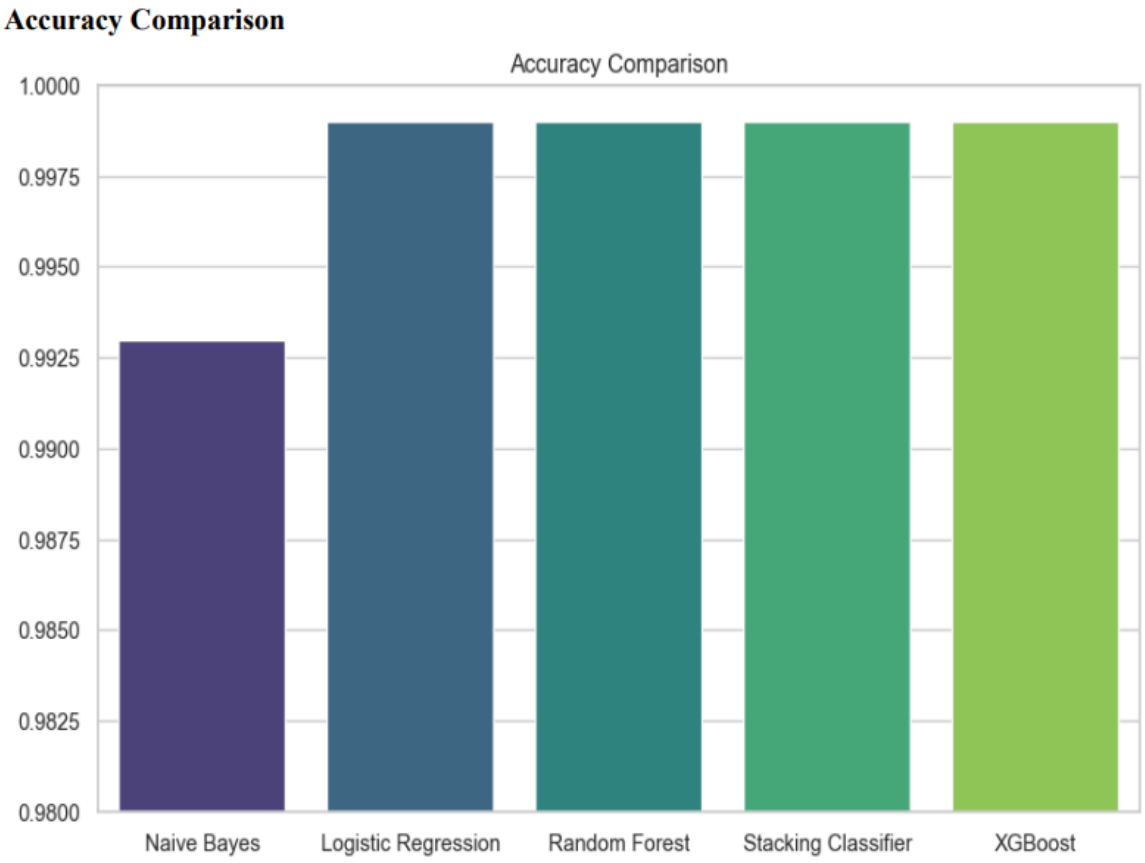


Figure 21 All Models Accuracy Comparision

Precision, Recall, and F1-Score Comparison

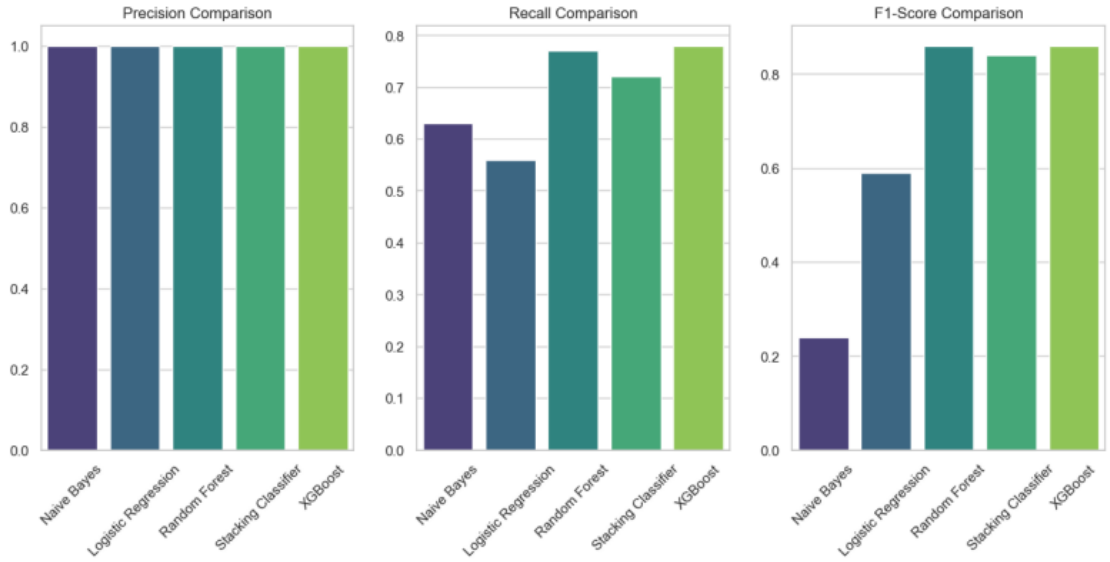
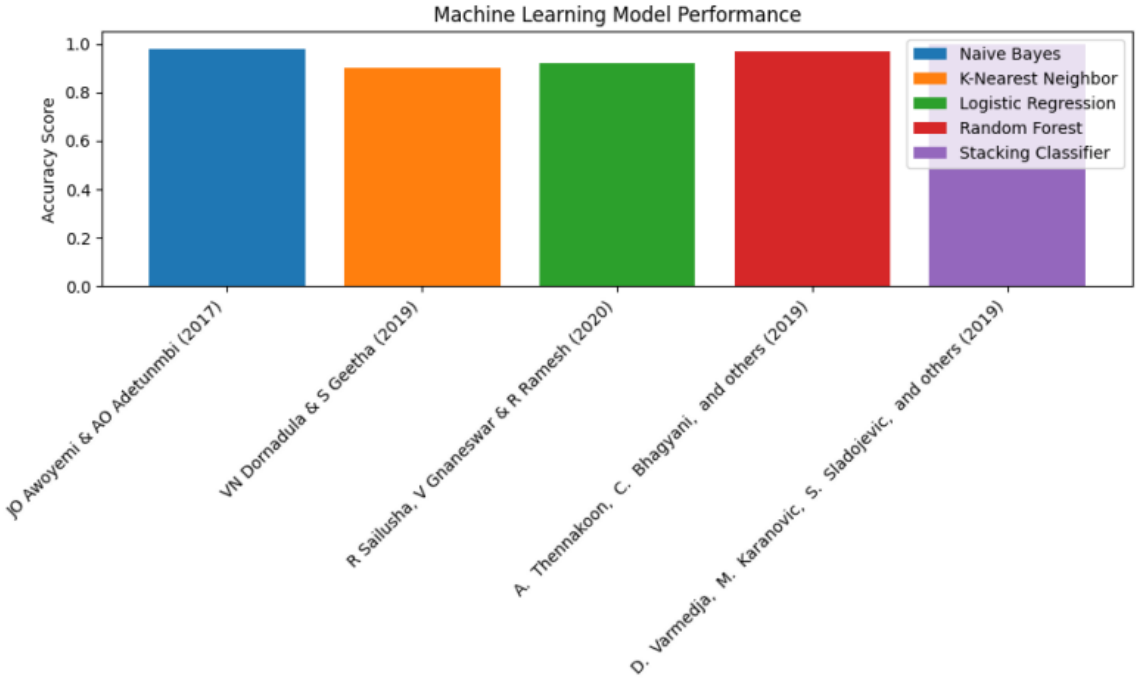


Figure 22 All Models Precision, Recall, F1Score Comparision

Comparision



Other Findings