## Project Development Phase
## Model Performance Test

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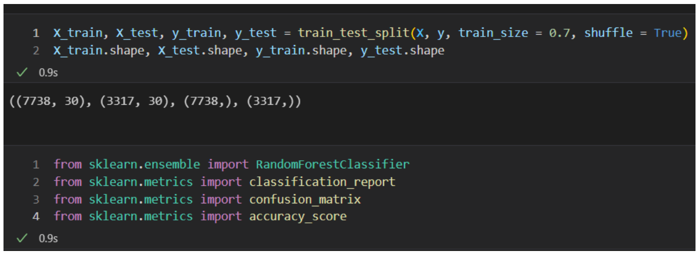
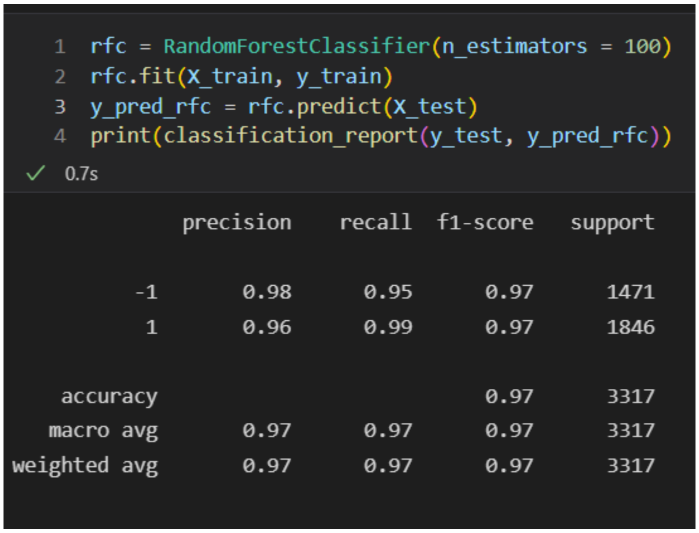
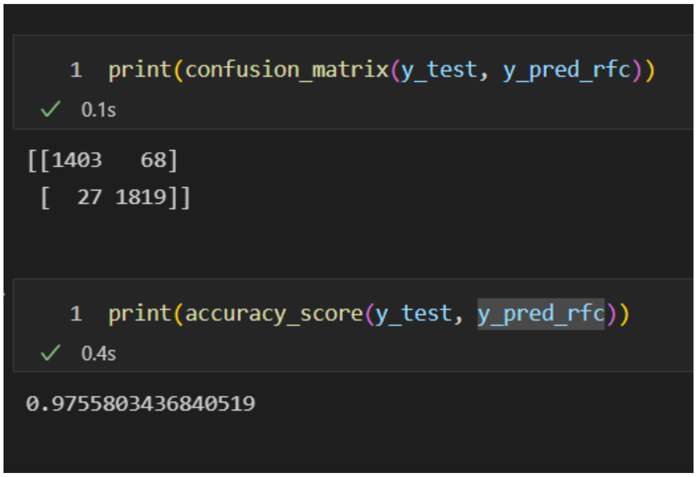
|---|---|
| Date | 19 November 2022 |
| Team ID | PNT2022TMID35524 |
| Project Name | Project - Web Phishing Detection |
| Maximum Marks | 10 Marks |

### Model Performance Testing:

| S.No. | Parameter | Values | Screenshot |
|---|---|---|---|
| 1. | Metrics | **Classification Model:**<br>Confusion Matrix -<br>`[[1401   50]`<br>` [  31 1835]],`<br>Accuracy Score-<br>`0.9755803436840519`<br>& Classification Report (included in screenshot) | <br><br> |

```
X_train, X_test, y_train, y_test = train_test_split(X, y, train_size = 0.7, shuffle = True)
X_train.shape, X_test.shape, y_train.shape, y_test.shape
```
✓ 0.9s

```
((7738, 30), (3317, 30), (7738,), (3317,))
```

```
from sklearn.ensemble import RandomForestClassifier
from sklearn.metrics import classification_report
from sklearn.metrics import confusion_matrix
from sklearn.metrics import accuracy_score
```
✓ 0.9s

```
rfc = RandomForestClassifier(n_estimators = 100)
rfc.fit(X_train, y_train)
y_pred_rfc = rfc.predict(X_test)
print(classification_report(y_test, y_pred_rfc))
```
✓ 0.7s

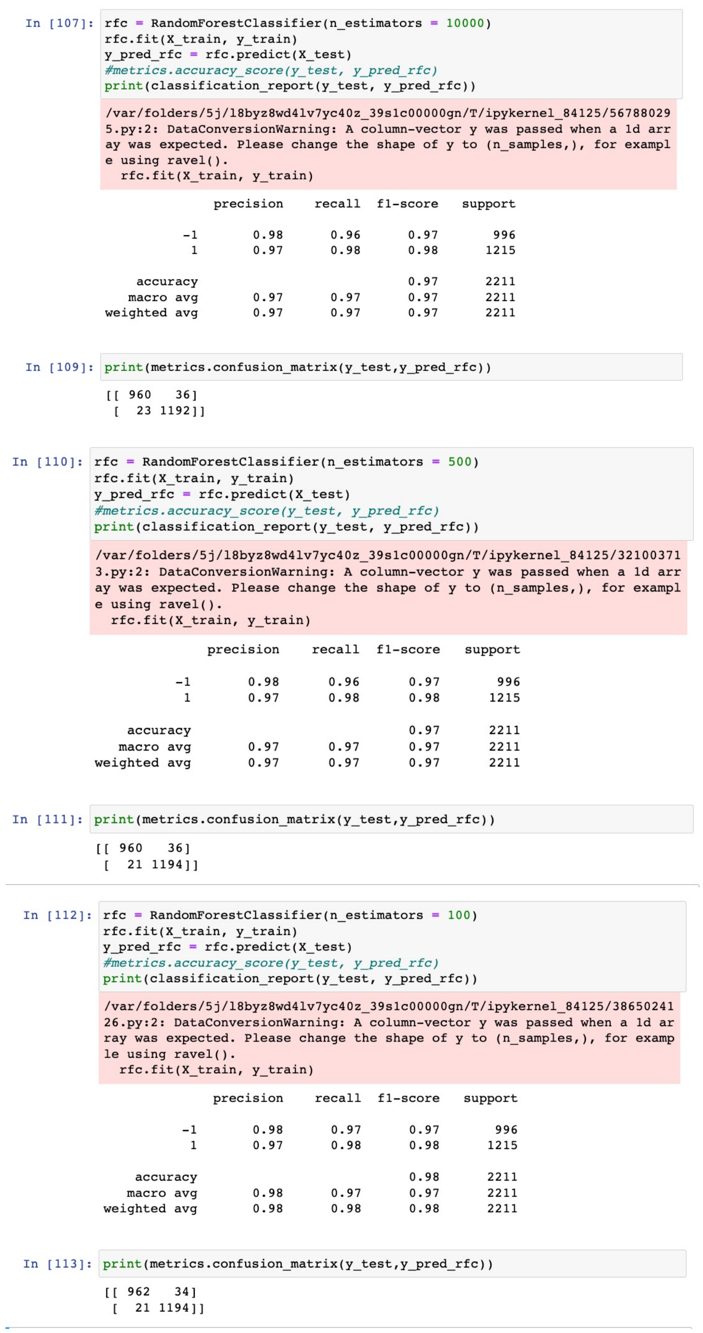
```
              precision    recall  f1-score   support

          -1       0.98      0.95      0.97      1471
           1       0.96      0.99      0.97      1846

    accuracy                           0.97      3317
   macro avg       0.97      0.97      0.97      3317
weighted avg       0.97      0.97      0.97      3317
```

```
print(confusion_matrix(y_test, y_pred_rfc))
```
✓ 0.1s

```
[[1403   68]
 [  27 1819]]
```

```
print(accuracy_score(y_test, y_pred_rfc))
```
✓ 0.4s

```
0.9755803436840519
```

| | | | |
|---|---|---|---|
| 2. | Tune the Model | Hyperparameter Tuning - Number of estimators tweaked and best model was identified: 100 |  |

```
In [107]: rfc = RandomForestClassifier(n_estimators = 10000)
          rfc.fit(X_train, y_train)
          y_pred_rfc = rfc.predict(X_test)
          #metrics.accuracy_score(y_test, y_pred_rfc)
          print(classification_report(y_test, y_pred_rfc))

          /var/folders/5j/l8byz8wd4lv7yc40z_39s1c00000gn/T/ipykernel_84125/56788029
          5.py:2: DataConversionWarning: A column-vector y was passed when a 1d arr
          ay was expected. Please change the shape of y to (n_samples,), for exampl
          e using ravel().
            rfc.fit(X_train, y_train)

                        precision    recall  f1-score   support

                    -1       0.98      0.96      0.97       996
                     1       0.97      0.98      0.98      1215

              accuracy                           0.97      2211
             macro avg       0.97      0.97      0.97      2211
          weighted avg       0.97      0.97      0.97      2211


In [109]: print(metrics.confusion_matrix(y_test,y_pred_rfc))

          [[ 960   36]
           [  23 1192]]

In [110]: rfc = RandomForestClassifier(n_estimators = 500)
          rfc.fit(X_train, y_train)
          y_pred_rfc = rfc.predict(X_test)
          #metrics.accuracy_score(y_test, y_pred_rfc)
          print(classification_report(y_test, y_pred_rfc))

          /var/folders/5j/l8byz8wd4lv7yc40z_39s1c00000gn/T/ipykernel_84125/32100371
          3.py:2: DataConversionWarning: A column-vector y was passed when a 1d arr
          ay was expected. Please change the shape of y to (n_samples,), for exampl
          e using ravel().
            rfc.fit(X_train, y_train)

                        precision    recall  f1-score   support

                    -1       0.98      0.96      0.97       996
                     1       0.97      0.98      0.98      1215

              accuracy                           0.97      2211
             macro avg       0.97      0.97      0.97      2211
          weighted avg       0.97      0.97      0.97      2211


In [111]: print(metrics.confusion_matrix(y_test,y_pred_rfc))

          [[ 960   36]
           [  21 1194]]

In [112]: rfc = RandomForestClassifier(n_estimators = 100)
          rfc.fit(X_train, y_train)
          y_pred_rfc = rfc.predict(X_test)
          #metrics.accuracy_score(y_test, y_pred_rfc)
          print(classification_report(y_test, y_pred_rfc))

          /var/folders/5j/l8byz8wd4lv7yc40z_39s1c00000gn/T/ipykernel_84125/38650241
          26.py:2: DataConversionWarning: A column-vector y was passed when a 1d ar
          ray was expected. Please change the shape of y to (n_samples,), for examp
          le using ravel().
            rfc.fit(X_train, y_train)

                        precision    recall  f1-score   support

                    -1       0.98      0.97      0.97       996
                     1       0.97      0.98      0.98      1215

              accuracy                           0.98      2211
             macro avg       0.98      0.97      0.97      2211
          weighted avg       0.98      0.98      0.98      2211


In [113]: print(metrics.confusion_matrix(y_test,y_pred_rfc))

          [[ 962   34]
           [  21 1194]]
```