Project Development Phase
Model Performance Test

Date	18 November 2022
Team ID	PNT2022TMID45454
Project Name	Project – Web Phishing Detection
Maximum Marks	10 Marks

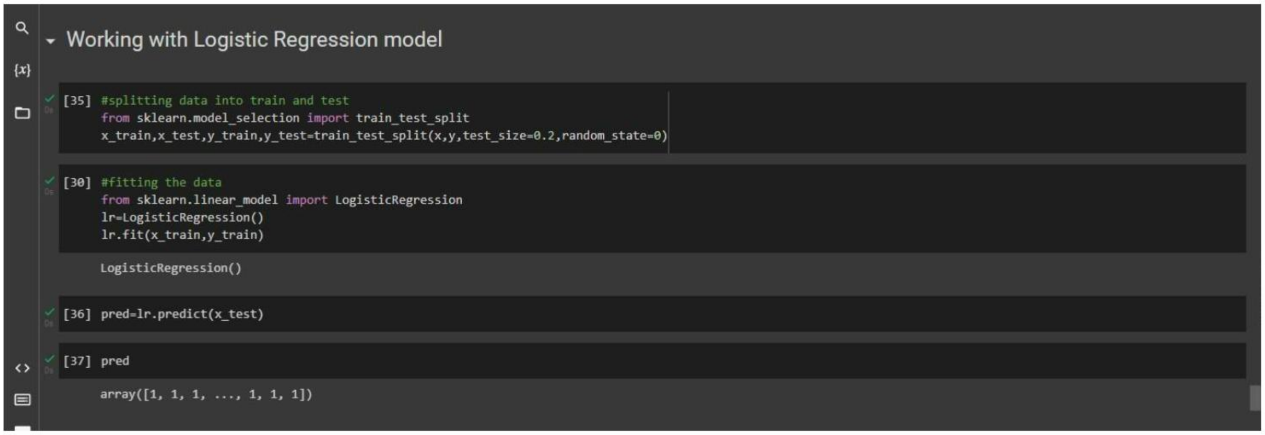
Model Performance Testing:

Project team shall fill the following information in model performance testing template.

S.No.	Parameter	Values	Screenshot
1.	Metrics	**Regression Model: Logistic Regression** MAE – 0.26142017186793304 MSE - 0.5228403437358661 RMSE - 0.7230769971004928 R2 score - -2.888673182487615 **Classification Model: Decision Tree Classifier** Confusion Matrix - array([[61, 249], [26, 1875]]) Accuracy Score- 0.8756218905472637 Classification Report – refer screenshot	Attached Below
2.	Tune the Model	Hyperparameter Tuning - Validation Method -	Attached Below

1. METRICS:

REGRESSION MODEL: LOGISTIC REGRESSION



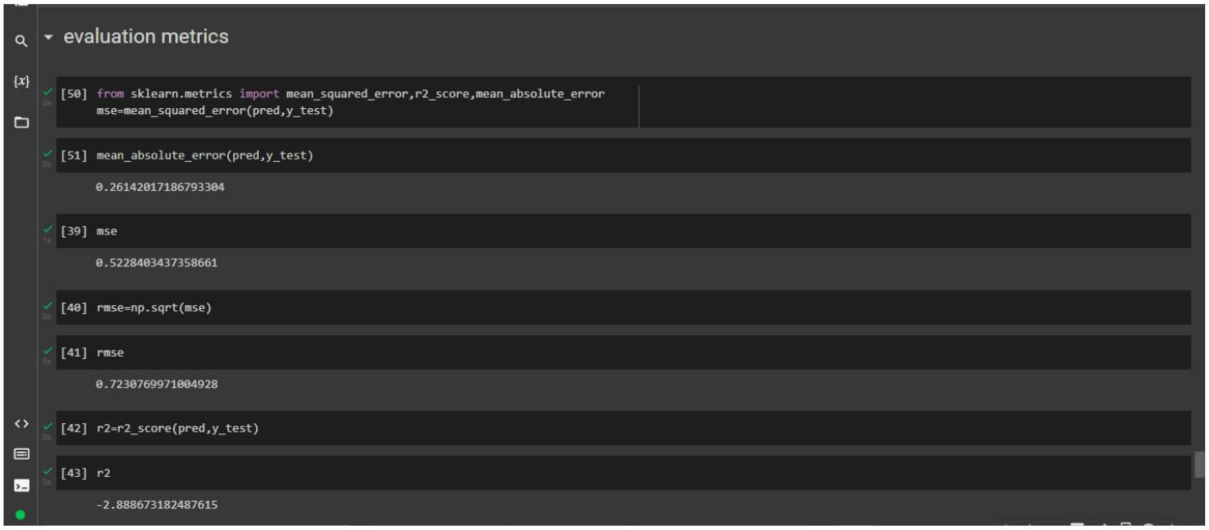
Working with Logistic Regression model

```
[35] #splitting data into train and test
     from sklearn.model_selection import train_test_split
     x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.2,random_state=0)

[30] #fitting the data
     from sklearn.linear_model import LogisticRegression
     lr=LogisticRegression()
     lr.fit(x_train,y_train)

     LogisticRegression()

[36] pred=lr.predict(x_test)

[37] pred

     array([1, 1, 1, ..., 1, 1, 1])
```

EVALUATION METRICS:

Here are some evaluation metrics used for regression they are,

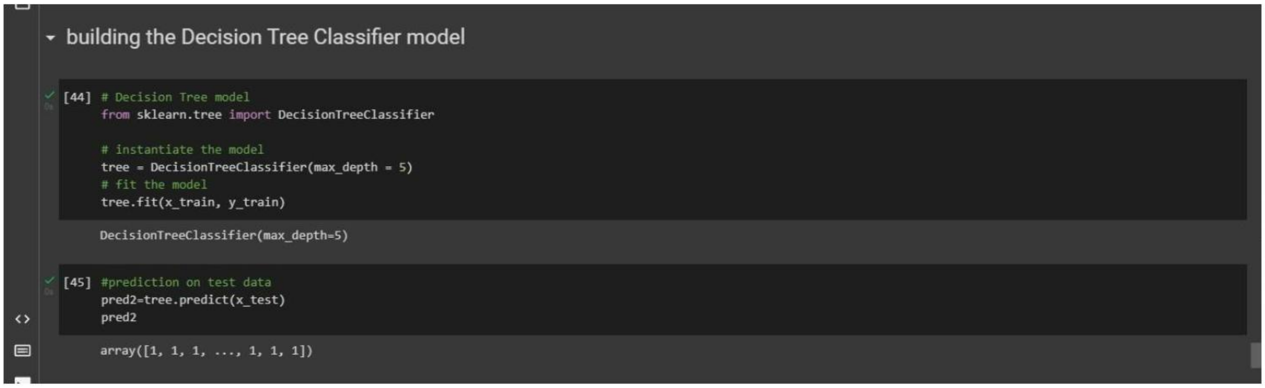
- R2 Score
- Mean Square Error(MSE)
- RMSE(Root Mean Square Error)
- Mean Absolute Error(MAE)



evaluation metrics

```
[50] from sklearn.metrics import mean_squared_error,r2_score,mean_absolute_error
     mse=mean_squared_error(pred,y_test)

[51] mean_absolute_error(pred,y_test)

     0.26142017186793304

[39] mse

     0.5228403437358661

[40] rmse=np.sqrt(mse)

[41] rmse

     0.7230769971004928

[42] r2=r2_score(pred,y_test)

[43] r2

     -2.888673182487615
```

CLASSIFICATION MODEL: DECISION TREE CLASSIFIER



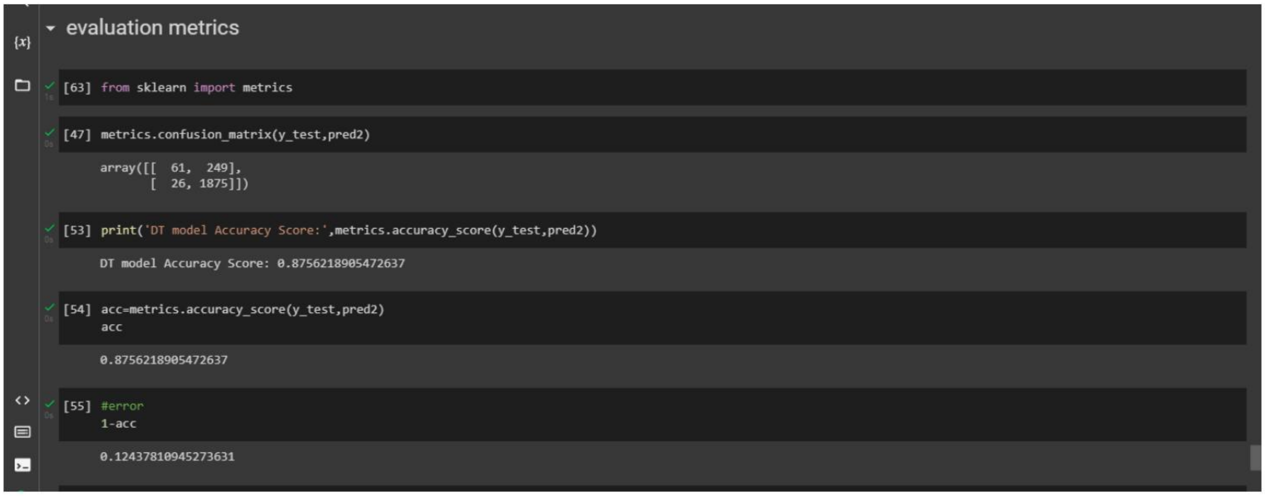
building the Decision Tree Classifier model

```
[44] # Decision Tree model
     from sklearn.tree import DecisionTreeClassifier

     # instantiate the model
     tree = DecisionTreeClassifier(max_depth = 5)
     # fit the model
     tree.fit(x_train, y_train)

     DecisionTreeClassifier(max_depth=5)

[45] #prediction on test data
     pred2=tree.predict(x_test)
     pred2

     array([1, 1, 1, ..., 1, 1, 1])
```

EVALUATION METRICS:

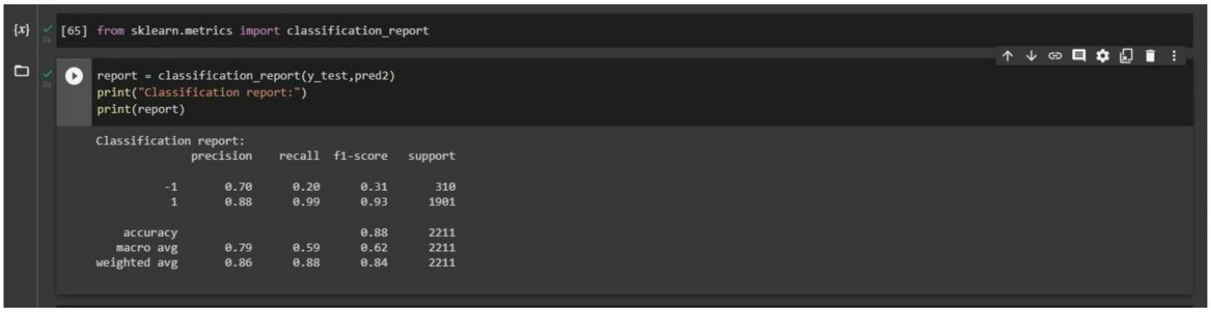
Some of the evaluation metrics is as follows

- Confusion matrix
- Accuracy score
- Classification report



evaluation metrics

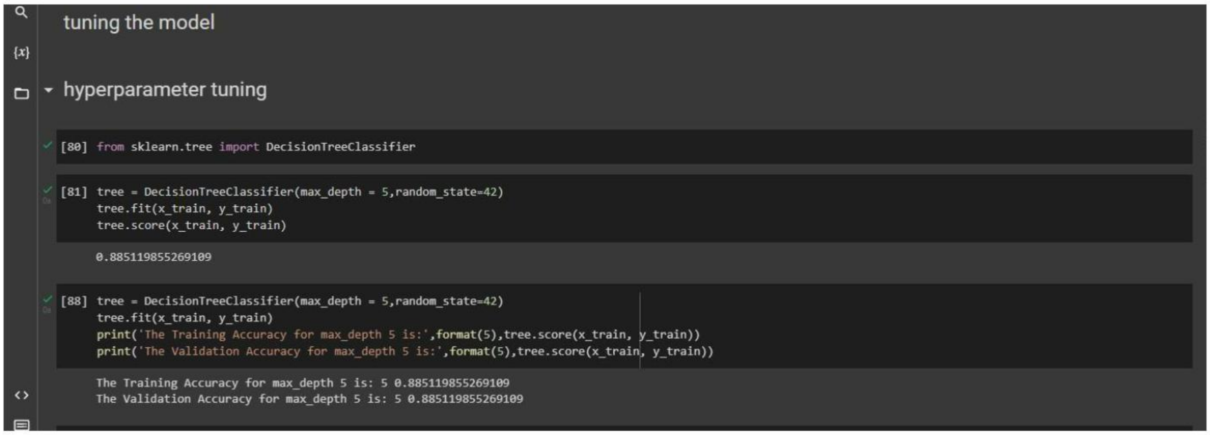
```
[63] from sklearn import metrics

[47] metrics.confusion_matrix(y_test,pred2)

     array([[  61,  249],
            [  26, 1875]])

[53] print('DT model Accuracy Score:',metrics.accuracy_score(y_test,pred2))

     DT model Accuracy Score: 0.8756218905472637

[54] acc=metrics.accuracy_score(y_test,pred2)
     acc

     0.8756218905472637

[55] #error
     1-acc

     0.12437810945273631
```



```
[65] from sklearn.metrics import classification_report

     report = classification_report(y_test,pred2)
     print("Classification report:")
     print(report)

     Classification report:
                   precision    recall  f1-score   support

               -1       0.70      0.20      0.31       310
                1       0.88      0.99      0.93      1901

         accuracy                           0.88      2211
        macro avg       0.79      0.59      0.62      2211
     weighted avg       0.86      0.88      0.84      2211
```

2.TUNE THE MODEL: DECISION TREE CLASSIFIER

HYPERPARAMETER TUNING:



tuning the model

hyperparameter tuning

```
[80] from sklearn.tree import DecisionTreeClassifier
```

```
[81] tree = DecisionTreeClassifier(max_depth = 5,random_state=42)
     tree.fit(x_train, y_train)
     tree.score(x_train, y_train)
```

```
0.885119855269109
```

```
[88] tree = DecisionTreeClassifier(max_depth = 5,random_state=42)
     tree.fit(x_train, y_train)
     print('The Training Accuracy for max_depth 5 is:',format(5),tree.score(x_train, y_train))
     print('The Validation Accuracy for max_depth 5 is:',format(5),tree.score(x_train, y_train))
```

```
The Training Accuracy for max_depth 5 is: 5 0.885119855269109
The Validation Accuracy for max_depth 5 is: 5 0.885119855269109
```