Project Development Phase
Model Performance Test

Date	16 November 2022
Team ID	PNT2022TMID08829
Project Name	Project – Exploratory Analysis of Rainfall Prediction
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:** MAE - , MSE - , RMSE - , R2 score - **Classification Model:** Confusion Matrix - , Accuracy Score- & Classification Report -	See Below
2.	Tune the Model	Hyperparameter Tuning - Validation Method -	See Below

1. Metrics

Model: Random Forest Classifier

```
Out[72]: RandomForestRegressor(max_depth=100, max_features='sqrt', min_samples_leaf=4,
                               min_samples_split=10, n_estimators=800)
```

```
In [73]: y_train_predict=random_forest_model.predict(X_train)
         y_test_predict=random_forest_model.predict(X_test)
```

```
In [74]: print("-------Test Data--------")
         print('MAE:', metrics.mean_absolute_error(y_test, y_test_predict))
         print('MSE:', metrics.mean_squared_error(y_test, y_test_predict))
         print('RMSE:', np.sqrt(metrics.mean_squared_error(y_test, y_test_predict)))

         print("\n-------Train Data--------")
         print('MAE:', metrics.mean_absolute_error(y_train,y_train_predict))
         print('MSE:', metrics.mean_squared_error(y_train, y_train_predict))
         print('RMSE:', np.sqrt(metrics.mean_squared_error(y_train, y_train_predict)))
```

```
-------Test Data--------
MAE: 34.0736351101093
MSE: 2344.903660733718
RMSE: 48.424205318556524

-------Train Data--------
MAE: 25.959317224155633
MSE: 1459.517765598739
RMSE: 38.203635502380386
```

2. Tune the Model

Hyperparameter Tuning:

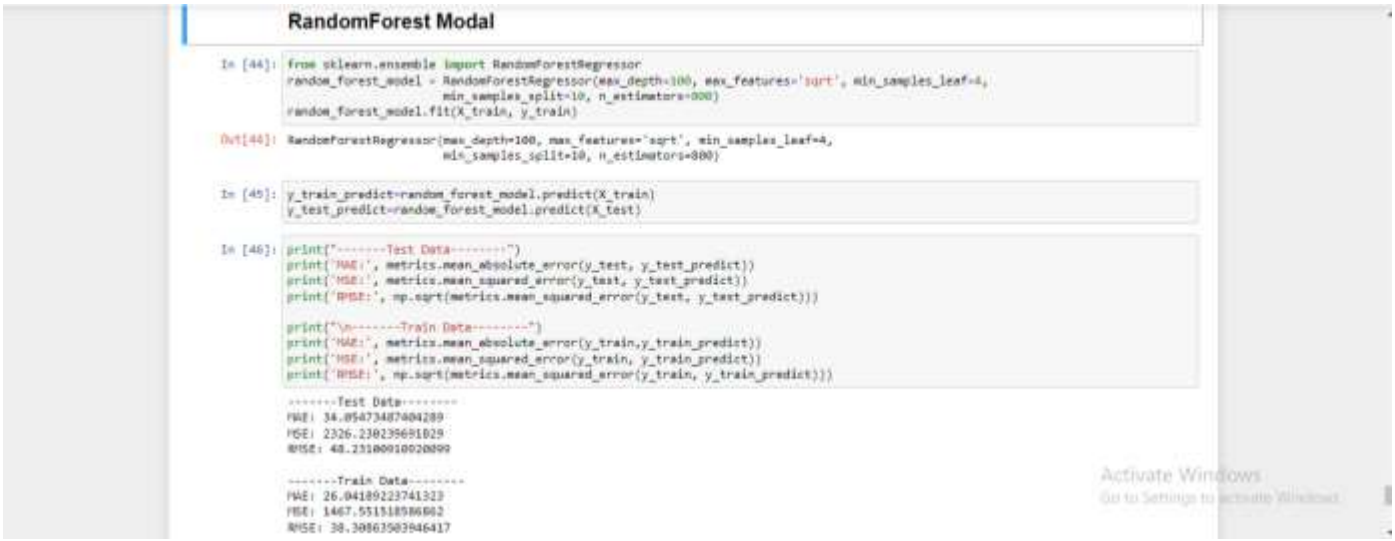
- The number of features is important and should be tuned in random forest classification.
- Initially all parameters in the dataset are taken as independent values to arrive at the dependent decision of Exploratory Analysis of Rainfall Prediction
- But the result was not accurate so used only 8 more correlated values as independent values to arrive at the dependent decision of Exploratory Analysis of Rainfall Prediction

Validation Method:

It involves **partitioning the training data set into subsets, where one subset is held out to test the performance of the model**. This data set is called the validation data set.

Cross validation is to use different models and identify the best:

Linear Regression Model performance values:



Hence we tested with Logistic regression and Random Forest Classification wherein the accuracy of Random Forest classification is 95% compared with Logistic Regression.

Metric	Linear Regression	Random Forest Classification
Accuracy	Testing accuracy : 41.699999999999996 Training accuracy : 33.1	Testing accuracy : 42.5 Training accuracy : 72.5
Other metrics		

```
from sklearn.linear_model import LogisticRegression
model=LogisticRegression(solver ='lbfgs',max_iter=500)
print('LogisticRegression\n')
model.fit(x_train.values,y_train.values.ravel())
prediction = model.predict(x_test)
from sklearn.metrics import confusion_matrix
print('confusion_matrix')
print(confusion_matrix(prediction,y_test))
print('\n')
print('accuracy_score')
print(accuracy_score(prediction,y_test))
print('\n')
```

```
LogisticRegression

confusion_matrix
[[49  0]
 [ 5 26]]


accuracy_score
0.9375
```

```
from sklearn.ensemble import RandomForestClassifier
model = RandomForestClassifier()
model.fit(x_train , y_train)
prediction = model.predict(x_test)
print(prediction)
from sklearn.metrics import confusion_matrix
print('RandomForest\n')
print('confusion_matrix')
print(confusion_matrix(prediction,y_test))
print('\n')
print('accuracy_score')
print(accuracy_score(prediction,y_test))
print('\n')
```

```
[0 0 0 0 1 0 0 0 1 0 0 0 1 1 0 0 0 1 1 0 1 1 0 1 0 1 0 0 1 0 0 1 0 0 0 0 1
 0 0 1 0 0 0 0 0 1 0 1 1 0 0 0 0 1 0 0 0 1 1 0 0 1 1 0 0 0 0 1 0 1 1 0 0 1
 0 0 0 0 1 0]
RandomForest

confusion_matrix
[[52  1]
 [ 2 25]]


accuracy_score
0.9625
```

The above table shows that Random Forest Classification gives better results over Logistic Regression.