Project Development Phase
Model Performance Test

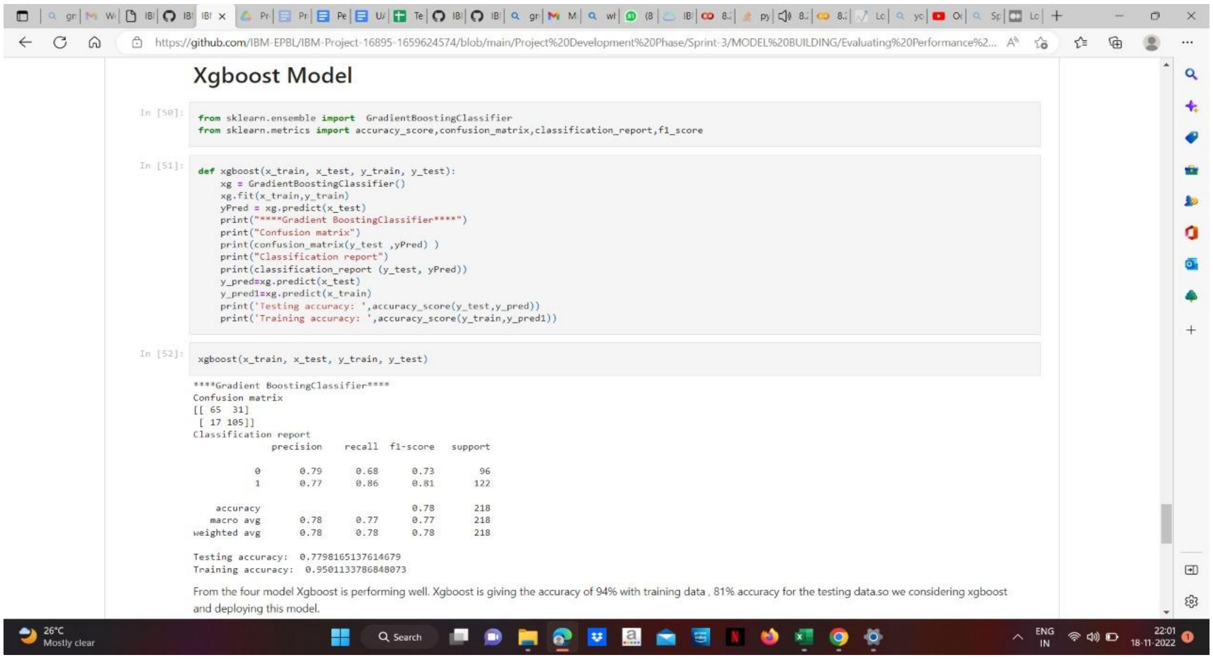
Date	10 November 2022
Team ID	PNT2022TMID27297
Project Name	Project - Smart Lender - Applicant Credibility Prediction for Loan Approval
Maximum Marks	10 Marks

Model Performance Testing:

For our model performance testing, we are using XG-boost for prediction.

S.No.	Parameter	Values	Screenshot
1.	Metrics	**Regression Model:** MAE - , MSE - , RMSE - , R2 score - **Classification Model:** Confusion Matrix - , Accuracy Score- & Classification Report -	FIGURE-1
2.	Tune the Model	Hyper parameter Tuning - Validation Method -	FIGURE-2

FIGURE-1



https://github.com/IBM-EPBL/IBM-Project-16895-1659624574/blob/main/Project%20Development%20Phase/Sprint-3/MODEL%20BUILDING/Evaluating%20Performance%2...

Xgboost Model

In [50]:
```
from sklearn.ensemble import  GradientBoostingClassifier
from sklearn.metrics import accuracy_score,confusion_matrix,classification_report,f1_score
```

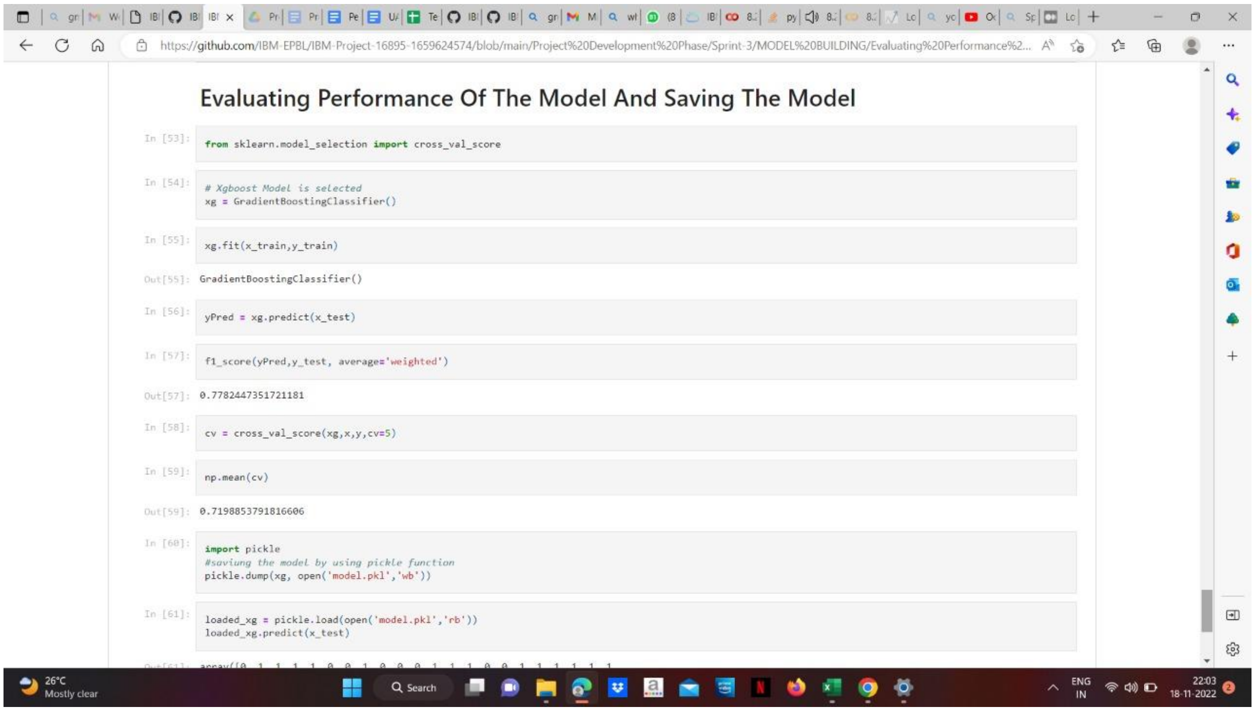
In [51]:
```
def xgboost(x_train, x_test, y_train, y_test):
    xg = GradientBoostingClassifier()
    xg.fit(x_train,y_train)
    yPred = xg.predict(x_test)
    print("****Gradient BoostingClassifier****")
    print("Confusion matrix")
    print(confusion_matrix(y_test ,yPred) )
    print("Classification report")
    print(classification_report (y_test, yPred))
    y_pred=xg.predict(x_test)
    y_pred1=xg.predict(x_train)
    print('Testing accuracy: ',accuracy_score(y_test,y_pred))
    print('Training accuracy: ',accuracy_score(y_train,y_pred1))
```

In [52]:
```
xgboost(x_train, x_test, y_train, y_test)
```

```
****Gradient BoostingClassifier****
Confusion matrix
[[ 65  31]
 [ 17 105]]
Classification report
              precision    recall  f1-score   support

           0       0.79      0.68      0.73        96
           1       0.77      0.86      0.81       122

    accuracy                           0.78       218
   macro avg       0.78      0.77      0.77       218
weighted avg       0.78      0.78      0.78       218

Testing accuracy:  0.7798165137614679
Training accuracy:  0.9501133786848073
```

From the four model Xgboost is performing well. Xgboost is giving the accuracy of 94% with training data , 81% accuracy for the testing data.so we considering xgboost and deploying this model.

FIGURE-2



https://github.com/IBM-EPBL/IBM-Project-16895-1659624574/blob/main/Project%20Development%20Phase/Sprint-3/MODEL%20BUILDING/Evaluating%20Performance%2...
26°C
Mostly clear
Search
ENG
IN
22:03
18-11-2022

Evaluating Performance Of The Model And Saving The Model

```
In [53]: from sklearn.model_selection import cross_val_score

In [54]: # Xgboost Model is selected
         xg = GradientBoostingClassifier()

In [55]: xg.fit(x_train,y_train)

Out[55]: GradientBoostingClassifier()

In [56]: yPred = xg.predict(x_test)

In [57]: f1_score(yPred,y_test, average='weighted')

Out[57]: 0.7782447351721181

In [58]: cv = cross_val_score(xg,x,y,cv=5)

In [59]: np.mean(cv)

Out[59]: 0.7198853791816606

In [60]: import pickle
         #saviung the model by using pickle function
         pickle.dump(xg, open('model.pkl','wb'))

In [61]: loaded_xg = pickle.load(open('model.pkl','rb'))
         loaded_xg.predict(x_test)

Out[61]: array([0, 1, 1, 1, 1, 0, 0, 1, 0, 0, 0, 1, 1, 1, 0, 0, 1, 1, 1, 1, 1, 1,
```