Project Development Phase
Model Performance Test

Date	19 November 2022
Team ID	PNT2022TMID31803
Project Name	Project – Early Detection of Chronic Kidney Disease using Machine Learning
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 - , Accuray Score- & Classification Report -	See Below
2.	Tune the Model	Hyperparameter Tuning - Validation Method -	See Below

1. Metrics

Model: Random Forest Classification

check model performance Random forest gives accurate predictions than logistic regression

```
In [51]: accuracy_score(y_test,y_pred)
Out[51]: 0.95

In [52]: conf_mat=confusion_matrix(y_test,y_pred)
         conf_mat
Out[52]: array([[52,  2],
                [ 2, 24]], dtype=int64)

In [53]: print(classification_report(y_test,y_pred))
                      precision    recall  f1-score   support

                   0       0.96      0.96      0.96        54
                   1       0.92      0.92      0.92        26

            accuracy                           0.95        80
           macro avg       0.94      0.94      0.94        80
        weighted avg       0.95      0.95      0.95        80


In [54]: pickle.dump(lgr,open('CKD.pkl','wb'))
```

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 Chronic Kidney Disease or No Chronic Kidney Disease.
- But the result was not accurate so used only 8 more correlated values as independent values to arrive at the dependent decision of Chronic Kidney Disease or not.

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:

Logistic Regression Model performance values:

check model performance Random forest gives accurate predictions than logistic regression

```
In [59]: accuracy_score(y_test,y_pred)
Out[59]: 0.925

In [60]: conf_mat=confusion_matrix(y_test,y_pred)
         conf_mat
Out[60]: array([[48,  6],
                [ 0, 26]], dtype=int64)

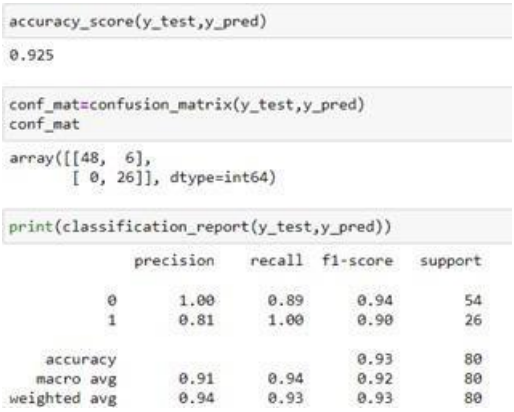
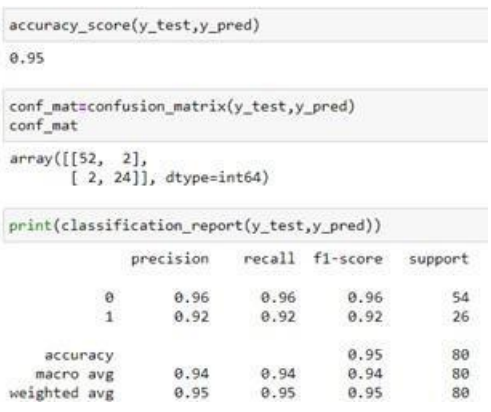
In [61]: print(classification_report(y_test,y_pred))
                      precision    recall  f1-score   support

                   0       1.00      0.89      0.94        54
                   1       0.81      1.00      0.90        26

            accuracy                           0.93        80
           macro avg       0.91      0.94      0.92        80
        weighted avg       0.94      0.93      0.93        80

In [54]: pickle.dump(lgr,open('CKD.pkl','wb'))
```

Hence we tested with Logistic regression and Random Forest Classification wherein the accuracy of Random Forest classification is 99% compared with Logistic Regression.

Metric	Logistic Regression	Random Forest Classification
Accuracy	0.925	0.95
Other metrics		

```
accuracy_score(y_test,y_pred)
0.925

conf_mat=confusion_matrix(y_test,y_pred)
conf_mat
array([[48,  6],
       [ 0, 26]], dtype=int64)

print(classification_report(y_test,y_pred))
              precision    recall  f1-score   support

           0       1.00      0.89      0.94        54
           1       0.81      1.00      0.90        26

    accuracy                           0.93        80
   macro avg       0.91      0.94      0.92        80
weighted avg       0.94      0.93      0.93        80
```

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           0       0.96      0.96      0.96        54
           1       0.92      0.92      0.92        26

    accuracy                           0.95        80
   macro avg       0.94      0.94      0.94        80
weighted avg       0.95      0.95      0.95        80
```

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