Model Optimization and Tuning Phase Report

Date	08-07-2024
Team ID	740070
Project Title	SmartLender - Applicant Credibility Prediction for Loan Approval
Maximum Marks	10 Marks

Model Optimization and Tuning Phase

The Model Optimization and Tuning Phase involves refining machine learning models for peak performance. It includes optimized model code, fine-tuning hyperparameters, comparing performance metrics, and justifying the final model selection for enhanced predictive accuracy and efficiency.

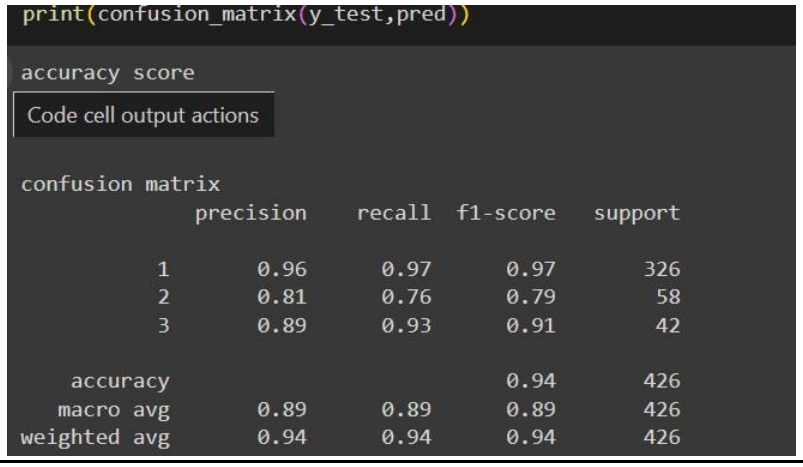
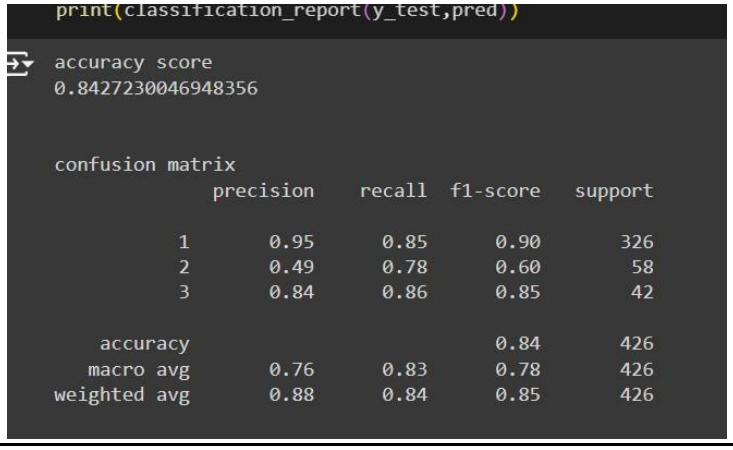
Hyperparameter Tuning Documentation (6 Marks):

Model	Tuned Hyperparameters	Optimal Values
Decision Tree	-	-
Random Forest	-	-

KNN	-	-
Logistic Regression	-	-

Performance Metrics Comparison Report (2 Marks):

Model	Optimized Metric
Decision Tree	print(classification_report(y_test,pred)) accuracy score 0.9295774647887324 confusion matrix precision recall f1-score support 1 0.97 0.95 0.96 326 2 0.72 0.81 0.76 58 3 0.93 0.93 0.93 42 accuracy 0.93 426 macro avg 0.87 0.90 0.88 426 weighted avg 0.93 0.93 0.93 426

Random Forest	
KNN	

```
print(confusion_matrix(y_test,pred))

accuracy score
Code cell output actions

confusion matrix
              precision    recall  f1-score   support

           1       0.96      0.97      0.97       326
           2       0.81      0.76      0.79        58
           3       0.89      0.93      0.91        42

    accuracy                           0.94       426
   macro avg       0.89      0.89      0.89       426
weighted avg       0.94      0.94      0.94       426
```

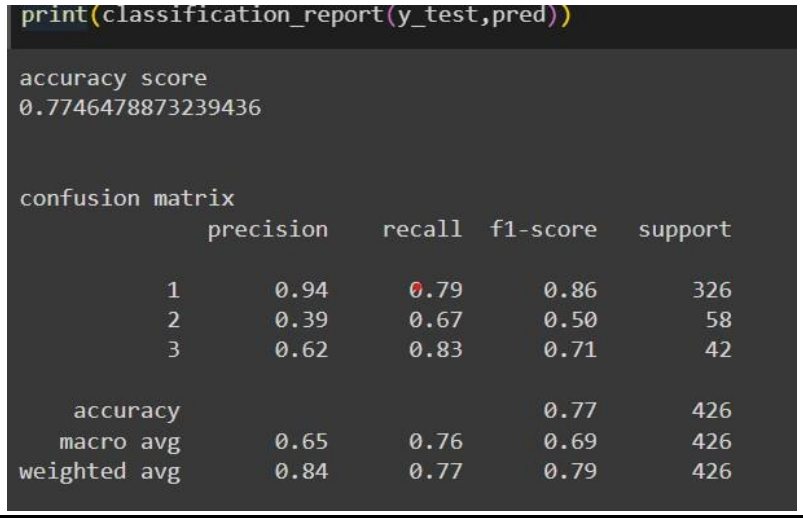
```
print(classification_report(y_test,pred))

accuracy score
0.8427230046948356


confusion matrix
              precision    recall  f1-score   support

           1       0.95      0.85      0.90       326
           2       0.49      0.78      0.60        58
           3       0.84      0.86      0.85        42

    accuracy                           0.84       426
   macro avg       0.76      0.83      0.78       426
weighted avg       0.88      0.84      0.85       426
```

Logistic Regression	

```
print(classification_report(y_test,pred))

accuracy score
0.7746478873239436


confusion matrix
              precision    recall  f1-score   support

           1       0.94      0.79      0.86       326
           2       0.39      0.67      0.50        58
           3       0.62      0.83      0.71        42

    accuracy                           0.77       426
   macro avg       0.65      0.76      0.69       426
weighted avg       0.84      0.77      0.79       426
```

Final Model Selection Justification (2 Marks):

Final Model	Reasoning
Random Forest	The Random Forest model was selected for its superior performance, exhibiting high accuracy ss. Its ability to handle complex relationships, minimize overfitting, and optimize predictive accuracy aligns with project objectives, justifying its selection as the final model.