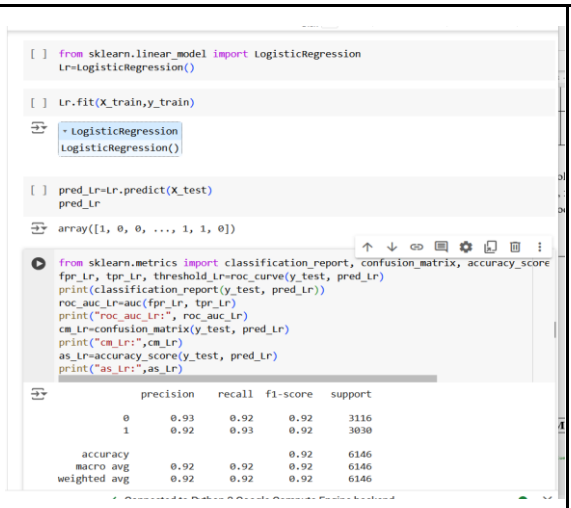
Model Optimization and Tuning Phase Report

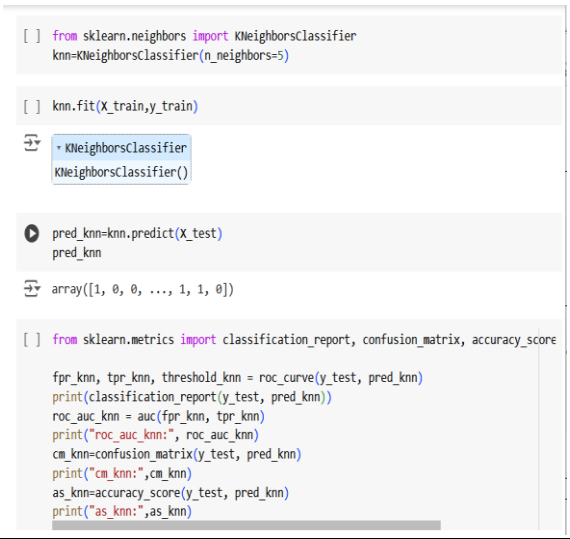
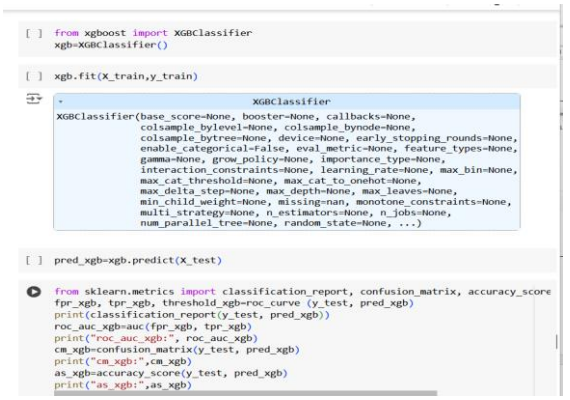
Date	15 July 2024
Team ID	740057
Project Title	Airline Review Classification
Maximum Marks	10 Marks

Model Optimization and Tuning Phase

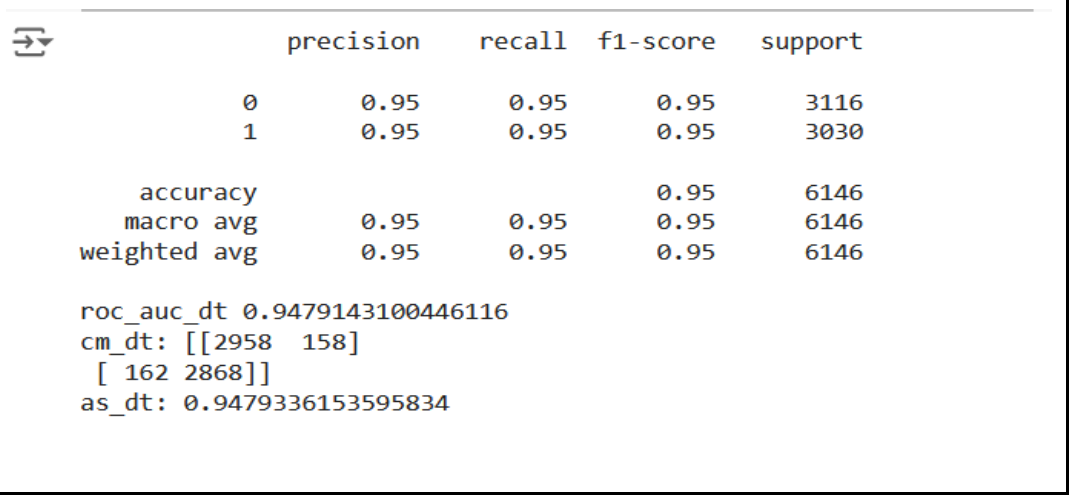
The Model Optimization and Tuning Phase involves refining machine learning models for peak performance. It includes optimized model code, fine-tuning hyperparameters, comparing performance metrics, and justifying the final model selection for enhanced predictive accuracy and efficiency.

Hyperparameter Tuning Documentation (6 Marks):

Logistic Regression		–

KNN		———
XGB		———

Performance Metrics Comparison Report (2 Marks):

Model	Optimized Metric
Decision Tree	

Random Forest	 precision recall f1-score support 0 0.95 0.96 0.96 3116 1 0.96 0.95 0.96 3030 accuracy 0.96 6146 macro avg 0.96 0.96 0.96 6146 weighted avg 0.96 0.96 0.96 6146 roc_auc_rfc 0.9582704194681343 cm_rfc: [[3003 113] [143 2887]] as_rfc: 0.9583468922876668
KNN	 precision recall f1-score support 0 0.96 0.93 0.95 3116 1 0.93 0.96 0.95 3030 accuracy 0.95 6146 macro avg 0.95 0.95 0.95 6146 weighted avg 0.95 0.95 0.95 6146 roc_auc_knn: 0.945478992700297 cm_knn: [[2913 203] [133 2897]] as_knn: 0.9453302961275627
XGB	 precision recall f1-score support 0 0.96 0.97 0.96 3116 1 0.97 0.96 0.96 3030 accuracy 0.96 6146 macro avg 0.96 0.96 0.96 6146 weighted avg 0.96 0.96 0.96 6146 roc_auc_xgb: 0.9630194630502845 cm_xgb: [[3011 105] [122 2908]] as_xgb: 0.9630654083957045

Final Model Selection Justification (2 Marks):

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