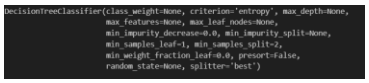
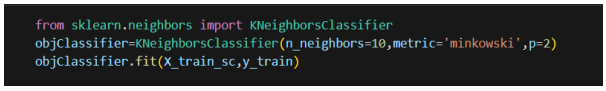
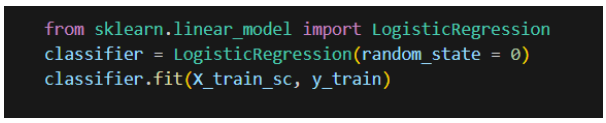
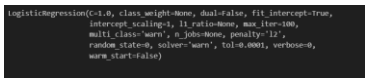
Model Optimization and Tuning Phase Template

Date	03-10-2024
Team ID	LTVIP2024TMID24897
Project Title	Flight delay prediction using ML
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		
KNN		
Logistic regression		

Performance Metrics Comparison Report (2 Marks):

Model	Baseline Metric, Optimized Metrics

Decision tree	`print("F1 score :",f1_score(y_test, y_pred, average="macro"))`
	`print("Precision Score :" , precision_score(y_test, y_pred, average="`
	`print("Recall Score :" , recall_score(y_test, y_pred, average="macro"`
	
	F1 score : 0.2725298912293622
	Precision Score : 0.6644134619299129
	Recall Score : 0.5006117468892067

KNN	`print("F1 score :",f1_score(y_test, y_pred, average="macro"))`
	`print("Precision Score :" , precision_score(y_test, y_pred, average="`
	`print("Recall Score :" , recall_score(y_test, y_pred, average="macro"`
	
	F1 score : 0.8696222002024336
	Precision Score : 0.8825899500527832
	Recall Score : 0.8609813308550668

Final Model Selection Justification (2 Marks):

Final Model	Reasoning

Decision Tree	`# Predicting the Test set results`
	`y_pred = classifierDT.predict(X_test)`
	
	`# Making the Confusion Matrix`
	`cm = confusion_matrix(y_test, y_pred)`
	`score = classifierDT.score(X_test_sc,y_test)`
	
	`cm`
	
	array([[1303, 982223],
	[59, 582189]])
	
	`score`
	
	0.9826194584914554

	This model has been selected because it has the high accuracy and f1-score compared to the other model mentioned above.