Model Optimization and Tuning Phase Template

Date	15 July 2024
Team ID	739725
Project Title	Flight Delay Prediction using Machine Learning.
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
Random Forest Classifier	-----	----
Logistic Regression	------	-----
Decision Tree Classifier	-------	----

Performance Metrics Comparison Report (2 Marks):

Model	Optimized Metric

Random Forest Classifier	`print(classification_report(y_test,y_test_predict1))`
	
	precision recall f1-score support
	
	0.0 0.94 0.96 0.95 1932
	1.0 0.71 0.59 0.65 293
	
	accuracy 0.92 2225
	macro avg 0.83 0.78 0.80 2225
	weighted avg 0.91 0.92 0.91 2225
	
	`confusion_matrix(y_test, y_test_predict1)`
	
	array([[1863, 69],
	[120, 173]])

Final Model Selection Justification (2 Marks):

Final Model	Reasoning

Random Forest Classifier	`def compareModel():`
	`print("train accuracy for rfc",accuracy_score(y_train_predict1,y_train))`
	`print("test accuracy for rfc",accuracy_score(y_test_predict1,y_test))`
	`print("train accuracy for dtc",accuracy_score(y_train_predict3,y_train))`
	`print("test accuracy for dtc",accuracy_score(y_test_predict3,y_test))`
	`print("train accuracy for etc",accuracy_score(y_train_predict4,y_train))`
	`print("test accuracy for etc",accuracy_score(y_test_predict4,y_test))`
	`print("train accuracy for lr",accuracy_score(y_train_predict2,y_train))`
	`print("test accuracy for lr",accuracy_score(y_test_predict2,y_test))`
	`compareModel()`
	
	train accuracy for rfc 1.0
	test accuracy for rfc 0.9150561797752809
	train accuracy for dtc 1.0
	test accuracy for dtc 0.8642696629213483
	train accuracy for etc 1.0
	test accuracy for etc 0.910561797752809
	train accuracy for lr 1.0
	test accuracy for lr 0.9182022471910113

	Accuracy of Random Forest Classi fier is more than other models.