Model Optimization and Tuning Phase Report

Date	10 July 2024
Team ID	SWTID1720499933
Project Title	Ecommerce Shipping 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):

Comparing model accuracy before & after applying hyperparameter tuning (Hyperparameter tuning is optional. For this project it is not required.)

Performance Metrics Comparison Report (2 Marks):

Model	Optimized Metric
SVM Classifier	Classification Report: SVM Classifier Training Score= 0.6907603136720082 SVM Classifier Test Score= 0.6495454545454545 precision recall f1-score support 0 0.55 0.75 0.63 896 1 0.77 0.58 0.66 1304 accuracy 0.65 2200 macro avg 0.66 0.66 0.65 2200 weighted avg 0.68 0.65 0.65 2200 Confusion Matrix: [[670 226] [545 759]]

Random Forest	Classification Report: RandomForestClassifier Training Score= 1.0 RandomForestClassifier Test Score= 0.6618181818181819 precision recall f1-score support 0 0.57 0.70 0.63 896 1 0.76 0.63 0.69 1304 accuracy 0.66 2200 macro avg 0.66 0.67 0.66 2200 weighted avg 0.68 0.66 0.66 2200 Confusion Matrix: [[628 268] [476 828]]
KNN	Classification Report: KNN Training Score= 0.7769064666439368 KNN Test Score= 0.6359090909090909 precision recall f1-score support 0 0.55 0.58 0.57 896 1 0.70 0.67 0.69 1304 accuracy 0.64 2200 macro avg 0.63 0.63 0.63 2200 weighted avg 0.64 0.64 0.64 2200 Confusion Matrix: [[521 375] [426 878]]
Gradient Boosting	Classification Report: XGBoost Training Score= 0.9136265484714172 XGBoost Test Score= 0.6368181818181818 precision recall f1-score support 0 0.55 0.60 0.57 896 1 0.71 0.66 0.68 1304 accuracy 0.64 2200 macro avg 0.63 0.63 0.63 2200 weighted avg 0.64 0.64 0.64 2200 Confusion Matrix: [[537 359] [440 864]]

Final Model Selection Justification (2 Marks):

Final Model	Reasoning
Random Forest Classifier	The Random Forest Classifier 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, justifyingits selection as the final model.