Model Optimization and Tuning Phase Template

Date	15 March 2024
Team ID	738193
Project Title	Hospital Readmission 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
Logistic regression	Multinomial logistic regression	Accuracy = 53 %
Decision tree	Criterion=’entropy’	Accuracy = 45 %
XGBClassifier	For k_fold=5 objective='multi:softmax', max_depth=10, learning_rate=0.1, n_estimators=1000	Accuracy = 57 %

Performance Metrics Comparison Report (2 Marks):

Model	Baseline Metric	Optimized Metric
Logistic regression	Accuracy = 50 %	Accuracy = 53 %
Decision tree	Accuracy = 44 %	Accuracy = 45 %
XGBClassifier	Accuracy = 55 %	Accuracy = 57 %

Final Model Selection Justification (2 Marks):

Final Model	Reasoning
XGBClassifier	For our hospital readmission prediction task, we selected the XGBoost classifier (XGBClassifier) as our final model due to its highest achieved accuracy of 57% among all models tested. XGBoost's robustness, interpretability, and compatibility with feature engineering techniques make it a suitable choice for our predictive modeling task.