Model Optimization and Tuning Phase Template

Date	01 December 2024
Team ID	739791
Project Title	Rice Crop Monitoring-Time Series Analysis
Maximum Marks	10 Marks

Model Optimization and Tuning Phase

The Model Optimization and Tuning Phase involves refining neural network 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 (8 Marks):

Model	Tuned Hyperparameters
Arima	```# Hyperparameter ranges for ARIMA p_values = range(0, 3) d_values = range(0, 2) q_values = range(0, 3)``` In ARIMA, the primary parameters to tune are: p (AR order), d (Integration order), q (MA order). Methods for Tuning are : Grid Search ,Criteria Optimization.

Sarima	 SARIMA adds seasonal components to ARIMA, requiring tuning of additional parameters: P, D, Q, m. Methods for Tuning: Exhaustive Search, Auto-SARIMA.
FaceBook Prophet	Facebook Prophet has fewer hyperparameters compared to ARIMA/SARIMA, making it easier to tune: Growth model (linear or logistic), Change points, Seasonality prior scale and changepoint prior scale. Methods for Tuning: Grid Search, Cross-Validation, Custom Seasonalities. –

Final Model Selection Justification (2 Marks):

Final Model	Reasoning
FaceBook Prophet	The Facebook Prophet model was selected for its superior performance, exhibiting high accuracy during train and test. Its often more accurate than Arima and Sarima. It averages their predictions, reducing the risk

	of overfitting. Effective in detecting anomalies in datasets, useful in fraud detection and network security.