**Model Optimization and Tuning Phase Template**

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| 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):

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| **Model** | **Tuned Hyperparameters** |
| Arima | 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):

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| **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. |