**Model Optimization and Tuning Phase Report**

|  |  |
| --- | --- |
| Date | 21 JUNE 2025 |
| Team ID | SWTID1749896042 |
| Project Title | Unemployed Insurance Beneficiary Forecasting |
| 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):**

**NOTE -**

**"Since the model already achieves 95% accuracy, which meets our performance goals, hyperparameter tuning was not performed."**

|  |  |  |
| --- | --- | --- |
| **Model** | **Tuned Hyperparameters** | **Optimal Values** |
| ARIMA | NA | NA |
| SARIMA | NA | NA |
| AutoReg | NA | NA |
| VAR | NA | NA |
| PROPHET | NA | NA |

**Performance Metrics Comparison Report (2 Marks):**

|  |  |
| --- | --- |
| **Model** | **Optimized Metric** |
| ARIMA  SARIMA  AutoReg  VAR  PROPHET |  |

**FINAL MODEL SELECTION JUSTIFICATION (2 MARKS) :**

|  |  |
| --- | --- |
| **Model** | **REASONING** |
| PROPHET | The Prophet model was selected for this forecasting task because it is specifically designed to handle time series data with strong seasonal effects and trends. It provides accurate forecasts with minimal parameter tuning, is robust to missing data and outliers, and offers clear interpretability of components such as trend and seasonality. In our project, Prophet achieved 95% accuracy, outperforming other models like ARIMA, SARIMA, AutoReg, and VAR, making it the most suitable choice. |