**Model Optimization and Tuning Phase Template**

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| Date | 5th July 2024 |
| Team ID | 739958 |
| Project Title | Food demand forecasting for food delivery company |
| 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):

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| --- | --- | --- |
| **Model** | **Tuned Hyperparameters** | **Optimal Values** |
| KNN | - | -RMSLE: 67.31466422917168 |
| Decision Tree | - | -RMSLE: 62.6445830592777 |
| Gradient Boosting Regressor | - | -RMSLE: 98.97455800242957 |

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

|  |  |  |
| --- | --- | --- |
| **Model** | **Baseline Metric** | **Optimized Metric** |
| KNN | - | - |
| Decision Tree | - | - |
| Gradient Boosting | - | - |

### Final Model Selection Justification (2 Marks):

|  |  |
| --- | --- |
| **Final Model** | **Reasoning** |
| Gradient Boosting | -The Gradient Boosting model was selected for its superior  performance, exhibiting high accuracy during hyperparameter tuning.  Its ability to handle complex relationships, minimize overfitting, and  optimize predictive accuracy aligns with project objectives, justifying  its selection as the final model. |