**Model Optimization and Tuning Phase Template**

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| Date | 15 October 2024 |
| Team ID | LTVIP2024TMID24789 |
| Project Title | TrafficTelligence: Advanced Traffic Volume Estimation with 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):

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| **Model** | **Tuned Hyperparameters** | **Optimal Values** |
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### Performance Metrics Comparison Report (2 Marks):

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| **Model** | **Baseline Metric** | **Optimized Metric** |
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### Final Model Selection Justification (2 Marks):

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| **Final Model** | **Reasoning** |
| Gradient Boosting | XG Boost was choosen as the final optimized model due to its high predictive accuracy and effieciency.Its built-in regularization helped prevent overfitting,while its ability to handle missing values simplified preprocessing.Additionally,XGBoost provides valuable insights into feature importance,enhancing interpretability and model refinement to align with project objectives justifying it as a final model. |