Model Optimization and Tuning Phase Report

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| Date | 10 March 2024 |
| Team ID | SWTID1720019244 |
| 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** |
| Decision Tree |  |  |
| Random Forest | A black background with white text  Description automatically generated | **A computer screen with a computer code  Description automatically generated** |

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| KNN | A screen shot of a computer program  Description automatically generated |  |
| Gradient Boosting | A screenshot of a computer code  Description automatically generated | A screenshot of a computer  Description automatically generated |

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

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| --- | --- |
| **Model** | **Optimized Metric** |
| Decision Tree |  |

|  |  |
| --- | --- |
| Random Forest | **A computer screen with a computer code  Description automatically generated** |
| KNN |  |
| XG Boost |  |

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

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| --- | --- |
| **Final Model** | **Reasoning** |
| Random Forest | Random Forest Regressor was chosen for TrafficTelligence due to its ability to handle complex relationships in data and its robust performance in predicting traffic volumes. It excels in handling non-linear relationships and interactions among features, which is crucial for accurately estimating traffic volumes based on diverse variables like time of day, weather conditions, and historical data. Additionally, Random Forests are less prone to overfitting compared to other models, making them a suitable choice for achieving reliable and accurate predictions in traffic volume estimation tasks. |