**Model Optimization and Tuning Phase Template**

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| Date | 15 July 2024 |
| Team ID | 740684 |
| Project Title | SpaceX Falcon 9 First Stage Landing Success Predictor |
| 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** |
| - | - | - |

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

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| **Model** | **Optimized Metric** |
| Logistic Regression |  |

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| **Final Model** | **Reasoning** |
| Logistic Regression | Logistic Regression was selected due to its superior performance across all evaluated metrics, including high accuracy (95.4%), exceptional AUC score (99.9%), robust precision (95.2%) and recall (100%), and |

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| --- | --- |
| Decision Tree |  |
| KNeighbors  Classifier |  |
| Random Forest |  |

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

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| --- | --- |
|  | balanced F1 score (97.5%). Its consistency in outperforming other models like Decision Tree, KNN, and Random Forest demonstrates reliability and suitability for predicting SpaceX Falcon 9 first stage landing success. Moreover, its interpretability and computational efficiency make it an optimal choice for this prediction task. |