**Model Optimization and Tuning Phase Template**

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| Date | 26 June 2024 |
| Team ID | 740043 |
| Project Title | Movie Box Office Gross Prediction |
| 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** |
| Random Forest | Number of tress max depth, min samples split | 100,10,2 |
| Neural network | Number of layers, learning rate, batch size | 3,0.01,32 |

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

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| --- | --- | --- |
| **Model** | **Baseline Metric** | **Optimized Metric** |
| Random Forest | RMSE 50 million | RMSE 40 million |
| Neural Network | RMSE 45 million | RMSE 35 million |

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

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| --- | --- |
| **Final Model** | **Reasoning** |
| Superior performance | "the best performance in terms of RMSE and R-squared compared to other models. Specifically, it had the lowest RMSE and the highest R-squared value, indicating better accuracy and predictive power." |