**Model Optimization and Tuning Phase Template**

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| Date | 18 June 2025 |
| Team ID | SWTID1749631993 |
| Project Title | Restaurant Recommendation System |
| 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** |
| TF-IDF + Nearest Neighbors | n\_neighbors, metric, algorithm | 11, cosine, brute |

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

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| --- | --- | --- |
| **Model** | **Baseline Metric** | **Optimized Metric** |
| TF-IDF + Nearest Neighbors | Informal validation via cosine similarity | Final validation based on top-rated recommendations relevance |

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

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| --- | --- |
| **Final Model** | **Reasoning** |
| TF-IDF + Nearest Neighbors | Chosen for its effectiveness in content-based filtering using textual cuisine similarity, no need for labeled data, and interpretable output for real users. |