

**Model Optimization and Tuning Phase Template**

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| Date | 9 July 2024 |
| Team ID | team-739821 |
| Project Title | Precise Coffee Quality 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** |
| Logistic  Regression | - | - |
| Decision Tree  Classifier | - | - |
| Random Forest  Classifier | - | - |

**NOTE:** In our project not provided grid search and hyperparameters topic.



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| **Model** | **Optimized Metric** |
| Logistic Regression |  |
| Decision Tree  Classifier |  |
| Random Forest  Classifier |  |



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

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

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| --- | --- |
| **Final Model** | **Reasoning** |
| Random Forest  Classifier | Random Forest was chosen for the coffee quality prediction project due  to its superior accuracy and robustness against overfitting, achieving an  optimized accuracy score of 94.9%. This ensemble method effectively  handles non-linear relationships and is less sensitive to noise and  outliers compared to other models. Additionally, Random Forest  provides valuable insights into feature importance, requires minimal  data preprocessing, and scales well with large datasets, making it the  optimal choice for delivering consistent and reliable coffee quality  assessments |

