**Model Optimization and Tuning Phase Template**

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| Date | 15 July 2024 |
| Team ID | 739787 |
| Project Title | Genetic Classification of An Individual By Using 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** |
| RandomForestClassifier | n\_estimators, min\_samples\_split, min\_samples\_leaf, max\_features, max\_depth, bootstrap | 10, 2, 1, log2, 30, False |

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

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| **Model** | **Baseline Metric** | **Optimized Metric** |
| RandomForestClassifier | Not provided (initial metric) | Accuracy: 1.0<br>Confusion Matrix: [[2, 0], [0, 3]]<br>Classification Report: Precision: 1.00, Recall: 1.00, F1-score: 1.00, Support: [2, 3] |

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

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| --- | --- |
| **Final Model** | **Reasoning** |
| RandomForestClassifier | The RandomForestClassifier was chosen due to its perfect prediction performance (accuracy of 1.0) and balanced hyperparameters. |