**Model Optimization and Tuning Phase Template**

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| Date | 15 March 2024 |
| Team ID | 740003 |
| Project Title | Disease Prediction 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** |
| KNN | --- | --- |
| SVC | --- | --- |
| Decision Tree | --- | --- |
| Random Forest | --- | --- |

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

|  |  |
| --- | --- |
| **Model** | **Optimized Metric** |
| KNN |  |
| SVC |  |
| Random Forest |  |

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

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| --- | --- |
| **Final Model** | **Reasoning** |
| KNN | KNN was chosen based on its demonstrated high accuracy in capturing intricate patterns within the dataset. Its ability to directly reflect the underlying structure of the data and adapt to varying complexities without assuming specific distributions made it the optimal choice. This aligns with the task's need for robust performance across different scenarios, ensuring reliable predictions with minimal computational overhead. |