# Model Optimization and Tuning Phase Template

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| Date | 15 July 2024 |
| Team ID | 739948 |
| Project Title | Early Prediction Of Chronic Kidney Disease |
| 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):**

| Model | Tuned Hyperparameters | Optimal Values |
|---|---|---|
| Logistic Regression | - | - |
| Random forest | - | - |

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

| Model | Optimized Metric |
|---|---|

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|---|---|
| Logistic Regression | Logistic Regression Model Evaluation:<br>Accuracy: 0.9<br>Confusion Matrix:<br>[[46 8]<br>[ 0 26]]<br>Classification Report:<br>precision recall f1-score support<br><br>0 1.00 0.85 0.92 54<br>1 0.76 1.00 0.87 26<br><br>accuracy 0.90 80<br>macro avg 0.88 0.93 0.89 80<br>weighted avg 0.92 0.90 0.90 80 |
| Random forest | Random Forest Model Evaluation:<br>Accuracy: 0.95<br>Confusion Matrix:<br>[[52 2]<br>[ 2 24]]<br>Classification Report:<br>precision recall f1-score support<br><br>0 0.96 0.96 0.96 54<br>1 0.92 0.92 0.92 26<br><br>accuracy 0.95 80<br>macro avg 0.94 0.94 0.94 80<br>weighted avg 0.95 0.95 0.95 80 |

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

| Final Model | Reasoning |
|---|---|
| Random Forest | We have selected the Random Forest as best model due to the accuracy of the model. When we compare both models(logistic regression, random forest), the accuracy of the model is greater than Logistic regression. |