# Model Optimization and Tuning Phase Template

| Date | 15 March 2024 |
|---|---|
| Team ID | xxxxxx |
| Project Title | Predicting Co2 Emission By Countries 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):**

| Model | Tuned Hyperparameters | Optimal Values |
|---|---|---|
| Random Forest | n_estimators, random_state, n_jobs | 10, 52, -1 |

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

| Model | Baseline Metric | Optimized Metric |
|---|---|---|
| Random Forest | 0.8936 | 0.9896 |

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

| Final Model | Reasoning |
|---|---|
| Random Forest | Without modifying n_estimators, the model was overfit and was unable to handle values outside the dataset, resulting in a lower accuracy, therefore we picked Random forest (which has the highest accuracy in all the models we tested) and tuned it to have only 10 n_estimators. |