Model Optimization and Tuning Phase Template

Date	15 March 2024
Team ID	LTVIP2024TMID24776
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
Multinomial Naive Bayes	**Alpha** (smoothing parameter) **Fit Prior** (Bool)	**Alpha**: 0.5 **Fit Prior**: True
SVC (Sigmoid Kernel)	**C** (Regularization parameter) **Gamma** (Kernel coefficient)	**C**: 0.1 **Gamma**: 0.01
Decision Tree Classifier	**C** (Regularization parameter) **Gamma** (Kernel coefficient)	**C**: 1.0 **Gamma**: 0.1

Random Forest Classifier	**Max Depth** (Maximum depth of the tree) **Min Samples Split** (Minimum number of samples)	**Max Depth**: 5 **Min Samples Split**: 2

Performance Metrics Comparison Report (2 Marks):

Model	Baseline Metric	Optimized Metric
Multinomial Naive Bayes	**Accuracy**: 93% **F1 Score**: 0.92	**Accuracy**: 91% **F1 Score**: 0.88
SVC (Sigmoid Kernel)	**Accuracy**: 85% **F1 Score**: 0.80	**Accuracy**: 90% **F1 Score**: 0.91
Decision Tree Classifier	**Accuracy: 89%** **F1 Score: 0.85**	**Accuracy: 92%** **F1 Score: 0.90**
Random Forest Classifier	**Accuracy: 87%** **F1 Score: 0.83**	**Accuracy: 96%** **F1 Score: 0.94**

Final Model Selection Justification (2 Marks):

Final Model	Reasoning
Random Forest Classifier	1. **Robust Performance, Scalability** 2. **Optimized Performance, Feature Importance** 3. **Good Performance Metrics**

	4. Versatility