Model Optimization and Tuning Phase Template

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Team ID	SWTID1720090815
Project Title	Early Prediction Of Chronic Kidney Disease 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	Accuracy and Recall
Random Forest Classifier	`max_depth=5, max_features='log2', n_estimators=50`	Accuracy: 94.16% Recall: 88.88%
Logistic Regression	`C=0.1, solver='liblinear'`	Accuracy:93.33% Recall: 91.66%
Decision Tree Classifier	`max_depth=10, max_features='log2', min_samples_leaf=4, min_samples_split=5`	Accuracy: 90.00% Recall: 80.55%
XGBoost Classifier	`learning_rate=0.01 n_estimators=1000 min_child_weight=5`	Accuracy: 93.33%

	gamma=0 reg_lambda=1 reg_alpha=0.01	Recall: 94.44%

Performance Metrics Comparison Report (2 Marks):

Model	Baseline Metric	Optimized Metric
Random Forest Classifier	Accuracy: 95.00% Recall: 88.88%	Accuracy: 94.16% Recall: 88.88%
Logistic Regression	Accuracy: 92.50% Recall: 94.44%	Accuracy:93.33% Recall: 91.66%
Decision Tree Classifier	Accuracy: 94.16% Recall: 86.11%	Accuracy: 90.00% Recall: 80.55%
XGBoost Classifier	Accuracy: 92.50 % Recall:88.88%	Accuracy: 93.33% Recall: 94.44%

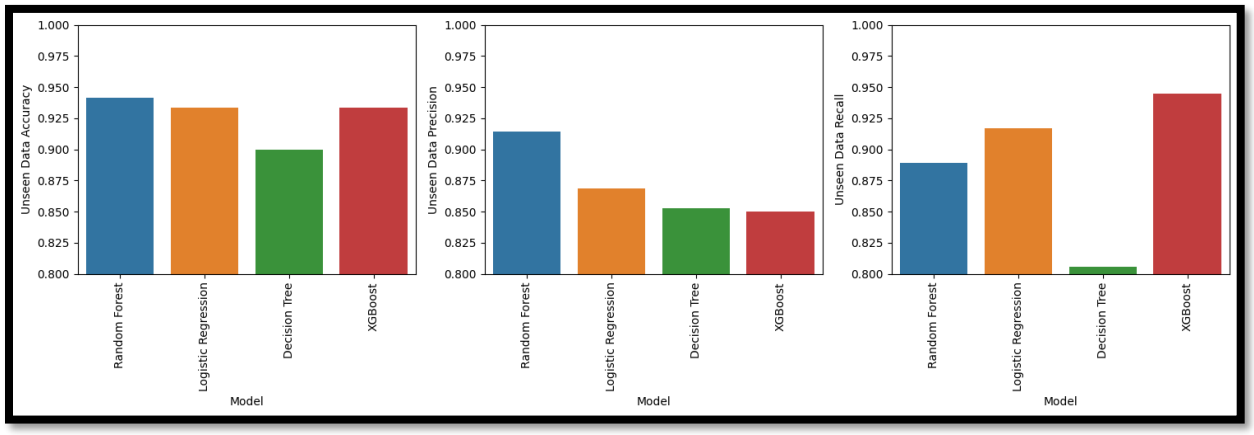

Fig. Comparison of models on Accuracy, Precision and Recall.

Final Model Selection Justification (2 Marks):

Final Model	Reasoning
XGBoost Classifier	A model for medical disease prediction must have a high recall score and accuracy as there are lives at stake. It is necessary for a model to diagnose people for CKD when they truly have. If a model diagnoses someone with no CKD when they have it, then it could be life threatening. This model has a good recall score with reasonable accuracy and is thus selected.