Model Optimization and Tuning Phase Template

Date	03 June 2024
Team ID	740682
Project Title	Polycystic Ovary Syndrome Classification 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

Model 1	`model_= DecisionTreeClassifier()`
	`model_.fit(X_train, y_train)`
	`dt_pred = model_.predict(X_test)`
	`acc_score = accuracy_score(y_test, dt_pred)`
	`print("acc_score of model %.2f"%accuracy_score(y_test, dt_pred))`
	
	`acc_score of model 0.79`
	
	`from sklearn.ensemble import RandomForestClassifier`
	`rfc = RandomForestClassifier(n_estimators=100)`
	`my_model = rfc.fit(X_train, y_train)`
	`#Making prediction and checking the test set`
	`from sklearn.metrics import accuracy_score`
	`pred_rfc = rfc.predict(X_test)`
	`accuracy = accuracy_score(y_test, pred_rfc)`
	`print(accuracy)`
	
	`0.8440366972477065`

Performance Metrics Comparison Report (2 Marks):

Model	Optimized Model

Decision Tree Classification	`model_= DecisionTreeClassifier()`
	`model_.fit(X_train, y_train)`
	`dt_pred = model_.predict(X_test)`
	`acc_score = accuracy_score(y_test, dt_pred)`
	`print("acc_score of model %.2f"%accuracy_score(y_test, dt_pred))`
	
	`acc_score of model 0.80`

Random Forest Classifier	`from sklearn.ensemble import RandomForestClassifier`
	`rfc = RandomForestClassifier(n_estimators=100)`
	`my_model = rfc.fit(X_train, y_train)`
	`#Making prediction and checking the test set`
	`from sklearn.metrics import accuracy_score`
	`pred_rfc = rfc.predict(X_test)`
	`accuracy = accuracy_score(y_test, pred_rfc)`
	`print(accuracy)`
	
	`0.8715596330275229`

Final Model Selection Justification (2 Marks):

Final Model	Reasoning
Random Forest Classifier	The reason to choose this model is because of High Accuracy