Model Optimization and Tuning Phase Template

Date	03 June 2024
Team ID	739718
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	```python
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

```python
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 | ```python
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 | ```python
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