Model Optimization and Tuning Phase Template

Date	15 July 2024
Team ID	739989
Project Title	Crop Prediction 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
KNN	---------	---------
Decision tree	---------	----------
SVM	---------	---------
Random Forest	--------	----------

Performance Metrics Comparison Report (2 Marks):

```
[ ] rfclassifier=RandomForestClassifier()
    rfclassifier.fit(X_train,y_train)
    y_pred=rfclassifier.predict(X_test)
    print(classification_report(y_test,y_pred))
```

```
              precision    recall  f1-score   support

       apple       1.00      1.00      1.00        23
      banana       1.00      1.00      1.00        20
   blackgram       1.00      1.00      1.00        21
    chickpea       1.00      1.00      1.00        22
     coconut       1.00      1.00      1.00        20
      coffee       1.00      1.00      1.00        24
      cotton       1.00      1.00      1.00        20
      grapes       1.00      1.00      1.00        20
        jute       0.90      1.00      0.95        18
 kidneybeans       1.00      1.00      1.00        19
      lentil       1.00      1.00      1.00        25
       maize       1.00      1.00      1.00        20
       mango       1.00      1.00      1.00        17
   mothbeans       1.00      1.00      1.00        14
    mungbean       1.00      1.00      1.00        20
   muskmelon       1.00      1.00      1.00        18
      orange       1.00      1.00      1.00        24
      papaya       1.00      1.00      1.00        15
  pigeonpeas       1.00      1.00      1.00        21
 pomegranate       1.00      1.00      1.00        23
        rice       1.00      0.89      0.94        19
  watermelon       1.00      1.00      1.00        17

    accuracy                           1.00       440
   macro avg       1.00      1.00      1.00       440
weighted avg       1.00      1.00      1.00       440
```

Final Model Selection Justification (2 Marks):

Final Model	Reasoning
Random Forest	The Random forest model usually provides high accuracy due to combining the predictions of multiple decision trees. Its ability to handle complex relationships, minimize overfitting. It can handle both classification and regression justifying its selection as the final model.