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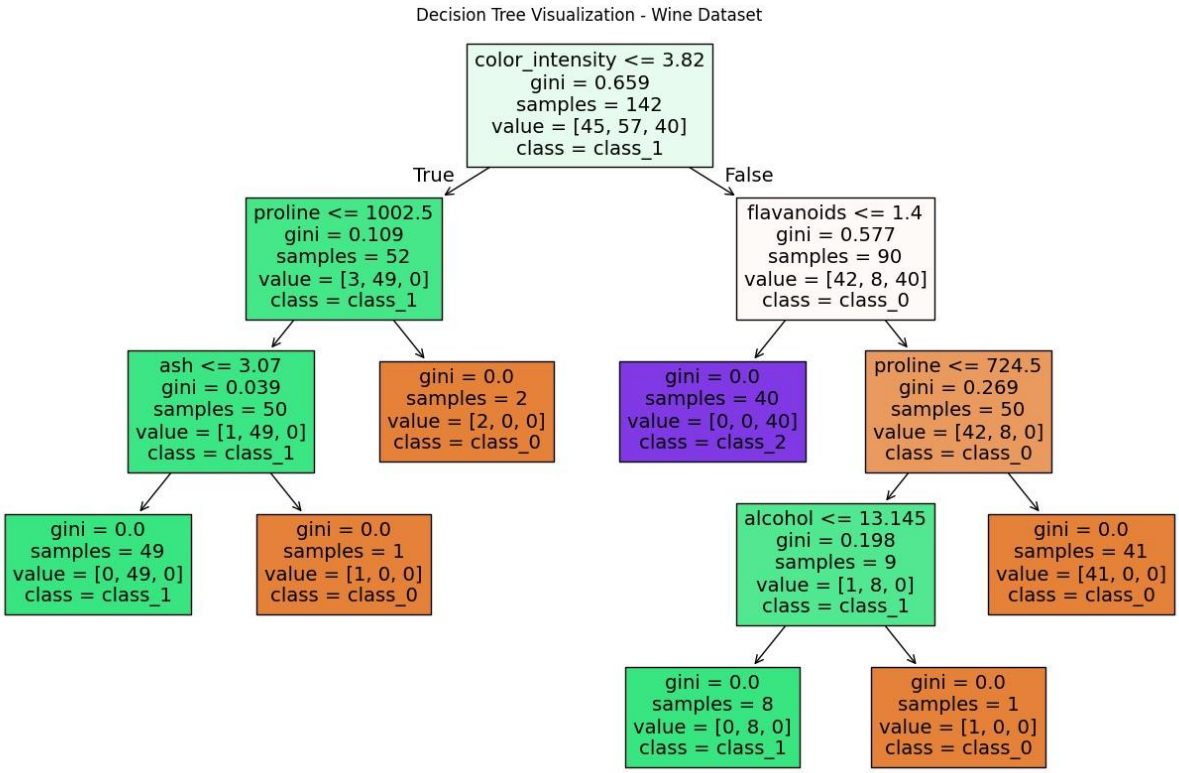
ROLL NO: 12

PRACTICAL 6

```
import pandas as pd
from sklearn.datasets import load_wine
from sklearn.model_selection import train_test_split
from sklearn.tree import DecisionTreeClassifier
from sklearn.metrics import accuracy_score, classification_report,
confusion_matrix from sklearn import tree import matplotlib.pyplot
as plt

# Load the Wine dataset
wine = load_wine() X =
wine.data y =
wine.target

# Split the data into training and testing sets (80% training, 20%
testing)
X_train, X_test, y_train, y_test = train_test_split(X, y,
test_size=0.2, random_state=42)

# Instantiate the Decision Tree classifier
classifier = DecisionTreeClassifier()

# Train the classifier on the training set
classifier.fit(X_train, y_train)

# Make predictions on the testing set
y_pred = classifier.predict(X_test)

# Evaluate the classifier
accuracy = accuracy_score(y_test, y_pred)
conf_matrix = confusion_matrix(y_test, y_pred)
classification_rep = classification_report(y_test, y_pred)

# Display the results
print(f"Wine Dataset - Accuracy: {accuracy:.4f}")
print("\nConfusion Matrix:\n", conf_matrix)
print("\nClassification Report:\n", classification_rep)
```

```
# Visualize the decision tree
plt.figure(figsize=(16, 10))
tree.plot_tree(classifier, feature_names=wine.feature_names,
class_names=wine.target_names,                filled=True)
plt.title("Decision Tree Visualization - Wine Dataset")
plt.show() Wine Dataset - Accuracy: 0.9444

Confusion Matrix:
 [[13  1  0]
 [ 0 14  0]
 [ 1  0  7]]
Classification Report:


              precision    recall  f1-score   support
0       0.93      0.93      0.93        14
1       0.93      1.00      0.97        14
2       1.00      0.88      0.93         8
    accuracy                           0.94        36
macro avg        0.95      0.93      0.94        36
weighted avg       0.95      0.94      0.94        36
```


Decision Tree Visualization - Wine Dataset
color_intensity <= 3.82
gini = 0.659
samples = 142
value = [45, 57, 40]
class = class_1
True
False
proline <= 1002.5
gini = 0.109
samples = 52
value = [3, 49, 0]
class = class_1
flavanoids <= 1.4
gini = 0.577
samples = 90
value = [42, 8, 40]
class = class_0
ash <= 3.07
gini = 0.039
samples = 50
value = [1, 49, 0]
class = class_1
gini = 0.0
samples = 2
value = [2, 0, 0]
class = class_0
gini = 0.0
samples = 40
value = [0, 0, 40]
class = class_2
proline <= 724.5
gini = 0.269
samples = 50
value = [42, 8, 0]
class = class_0
gini = 0.0
samples = 49
value = [0, 49, 0]
class = class_1
gini = 0.0
samples = 1
value = [1, 0, 0]
class = class_0
alcohol <= 13.145
gini = 0.198
samples = 9
value = [1, 8, 0]
class = class_1
gini = 0.0
samples = 41
value = [41, 0, 0]
class = class_0
gini = 0.0
samples = 8
value = [0, 8, 0]
class = class_1
gini = 0.0
samples = 1
value = [1, 0, 0]
class = class_0