Decision Tree Model Using Scikit-learn

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# Import necessary libraries
import pandas as pd
from sklearn.datasets import load_iris
from sklearn.model_selection import train_test_split
from sklearn.tree import DecisionTreeClassifier, plot_tree
from sklearn.metrics import classification_report, confusion_matrix
import matplotlib.pyplot as plt

# Load the Iris dataset
iris = load_iris()
X = pd.DataFrame(iris.data, columns=iris.feature_names)
y = pd.Series(iris.target, name='species')

# Split the dataset into training and test sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3, random_state=42)

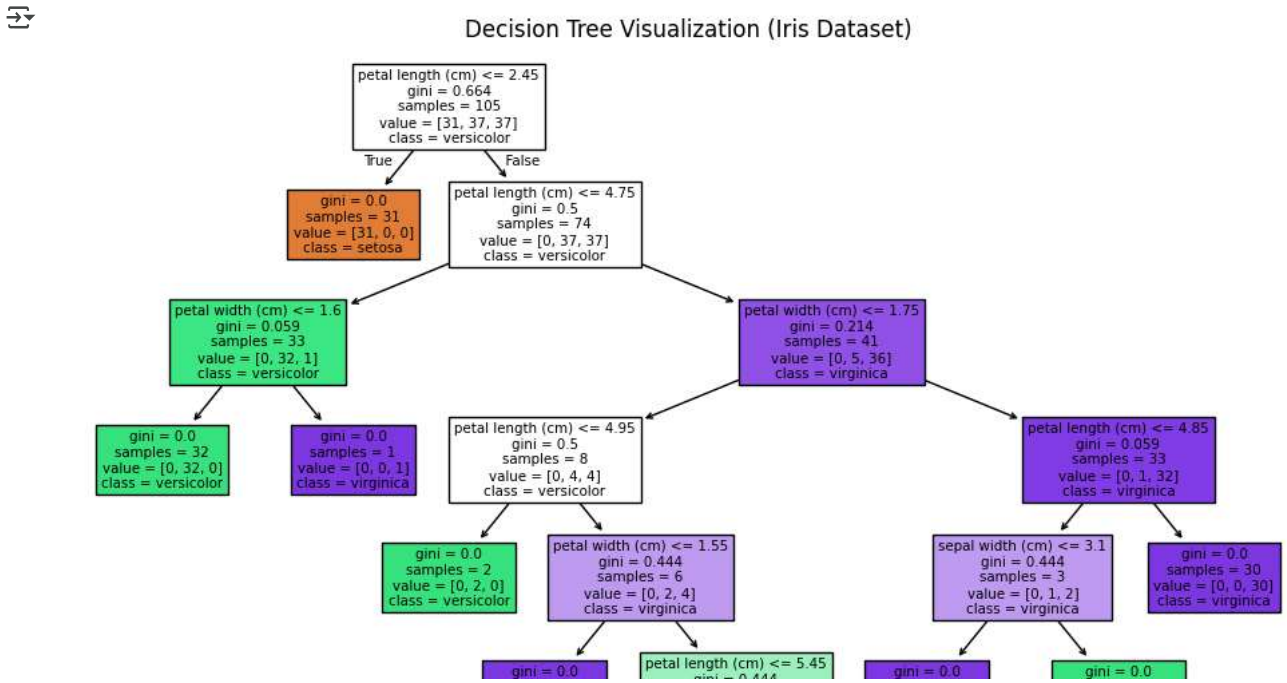
# Train the Decision Tree Classifier
clf = DecisionTreeClassifier(random_state=42)
clf.fit(X_train, y_train)

# Predict on the test set
y_pred = clf.predict(X_test)

# Generate classification report and confusion matrix
report = classification_report(y_test, y_pred, target_names=iris.target_names)
conf_matrix = confusion_matrix(y_test, y_pred)

# Visualize the decision tree
plt.figure(figsize=(12, 8))
plot_tree(clf, feature_names=iris.feature_names, class_names=iris.target_names, filled=True)
plt.title("Decision Tree Visualization (Iris Dataset)")
plt.show()

(report, conf_matrix)
```


Decision Tree Visualization (Iris Dataset)
petal length (cm) <= 2.45
gini = 0.664
samples = 105
value = [31, 37, 37]
class = versicolor
True
False
gini = 0.0
samples = 31
value = [31, 0, 0]
class = setosa
petal length (cm) <= 4.75
gini = 0.5
samples = 74
value = [0, 37, 37]
class = versicolor
petal width (cm) <= 1.6
gini = 0.059
samples = 33
value = [0, 32, 1]
class = versicolor
petal width (cm) <= 1.75
gini = 0.214
samples = 41
value = [0, 5, 36]
class = virginica
gini = 0.0
samples = 32
value = [0, 32, 0]
class = versicolor
gini = 0.0
samples = 1
value = [0, 0, 1]
class = virginica
petal length (cm) <= 4.95
gini = 0.5
samples = 8
value = [0, 4, 4]
class = versicolor
petal length (cm) <= 4.85
gini = 0.059
samples = 33
value = [0, 1, 32]
class = virginica
gini = 0.0
samples = 2
value = [0, 2, 0]
class = versicolor
petal width (cm) <= 1.55
gini = 0.444
samples = 6
value = [0, 2, 4]
class = virginica
sepal width (cm) <= 3.1
gini = 0.444
samples = 3
value = [0, 1, 2]
class = virginica
gini = 0.0
samples = 30
value = [0, 0, 30]
class = virginica
gini = 0.0
petal length (cm) <= 5.45
gini = 0.0
gini = 0.0