EXPNO:3

CLASSIFICATION WITH DECISION TREES

AIM

To implement a Decision Tree classifier and evaluate its performance using **accuracy score** and **confusion matrix** on a real-world dataset.

ALGORITHM

- 1. Import necessary libraries
- 2. Load a classification dataset (e.g., Iris or Titanic)
- 3. Split the dataset into training and test sets
- 4. Preprocess data if needed
- 5. Train a DecisionTreeClassifier from sklearn.tree
- 6. Predict on test data
- 7. Evaluate using:
 - Confusion Matrix
 - Accuracy Score
- 8. Visualize the Decision Tree (optional)

CODE:

Step 1: Import Libraries

from sklearn.datasets import load iris

from sklearn.tree import DecisionTreeClassifier, plot_tree

from sklearn.model selection import train test split

from sklearn.metrics import confusion matrix, accuracy score

import matplotlib.pyplot as plt

import seaborn as sns

Step 2: Load Dataset

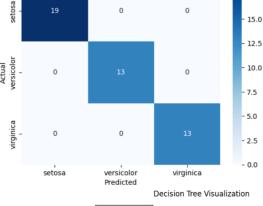
iris = load iris()

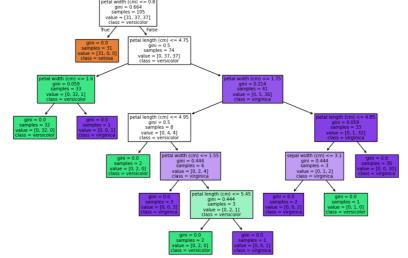
```
X = iris.data
y = iris.target
# Step 3: Split the dataset
X train, X test, y train, y test = train test split(X, y, test size=0.3, random state=42)
# Step 4: Train the Decision Tree Classifier
dt model = DecisionTreeClassifier(criterion='gini', random state=0)
dt model.fit(X train, y train)
# Step 5: Predict
y pred = dt model.predict(X test)
# Step 6: Evaluate the Model
cm = confusion matrix(y test, y pred)
acc = accuracy score(y test, y pred)
print("Confusion Matrix:\n", cm)
print("Accuracy Score:", acc)
# Step 7: Visualize Confusion Matrix
sns.heatmap(cm,
                         annot=True,
                                             cmap="Blues",
                                                                     xticklabels=iris.target names,
yticklabels=iris.target names)
plt.xlabel("Predicted")
plt.ylabel("Actual")
plt.title("Confusion Matrix")
plt.show()
# Step 8: Visualize the Decision Tree
plt.figure(figsize=(12,8))
plot tree(dt model,
                                    filled=True,
                                                                feature names=iris.feature names,
class names=iris.target names)
plt.title("Decision Tree Visualization")
```

plt.show()









RESULT:

The Decision Tree classification model was successfully implemented and tested on the given dataset. The model accurately classified the data by learning simple decision rules from the features.

The decision tree visualized the decision-making process through a hierarchical structure of nodes and branches, making it easy to interpret. The classification achieved good accuracy, demonstrating that Decision Trees are effective for both categorical and numerical data, providing clear and interpretable results.