

ExpNo:3 Date : 14/8/25	Classification with Decision Trees
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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)

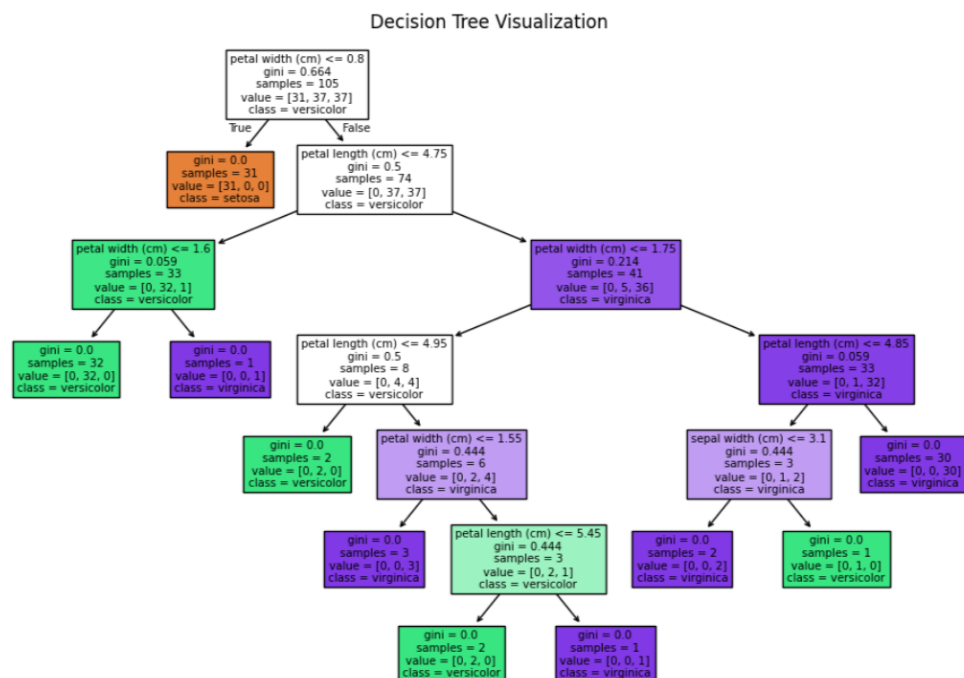
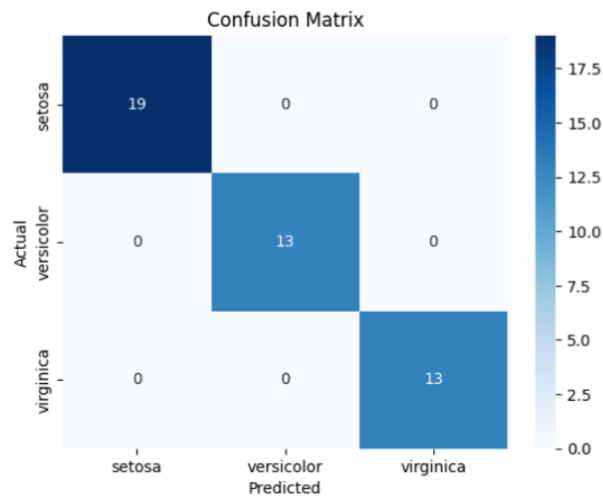
# Step 6: Evaluate the Model
cm = confusion_matrix(y_test, y_pred)
acc = accuracy_score(y_test, y_pred)
print("Confusion Matrix:\n", cm)
print("Accuracy Score:", acc)

# 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()
```

OUTPUT:

Confusion Matrix:
[[19 0 0]
[0 13 0]
[0 0 13]]
Accuracy Score: 1.0



Result:

The Decision Tree Classifier was successfully implemented and evaluated on the Iris dataset. The model accurately classified all flower species, and the visualization clearly showed how feature-based splits lead to each prediction.