Machine Learning
Assignment 6
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A1   09

Implement the Decision Tree algorithm using the Iris dataset

Code:
```python
import pandas as pd
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 dataset
df = pd.read_csv("iris.csv")  # Update filename if needed

# Drop the 'Sno' column
df.drop('Sno', axis=1, inplace=True)

# Features and target
X = df.drop('Species', axis=1)
y = df['Species']

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

# Initialize and train the Decision Tree classifier
clf = DecisionTreeClassifier(criterion='entropy', random_state=42)
clf.fit(X_train, y_train)

# Make predictions
y_pred = clf.predict(X_test)

# Evaluate the model
print("Accuracy:", accuracy_score(y_test, y_pred))
print("\nClassification Report:\n", classification_report(y_test, y_pred))
print("Confusion Matrix:\n", confusion_matrix(y_test, y_pred))

# Visualize the Decision Tree
plt.figure(figsize=(16,10))
tree.plot_tree(clf, filled=True, feature_names=X.columns, class_names=clf.classes_)
```

plt.title("Decision Tree for Iris Dataset")
plt.show()

Output:

```
PS C:\Users\admin\Onedrive\Desktop\6SEM\ML> python ass4.py
Accuracy: 1.0

Classification Report:
                 precision    recall  f1-score   support

    Iris-setosa       1.00      1.00      1.00        10
Iris-versicolor       1.00      1.00      1.00         9
 Iris-virginica       1.00      1.00      1.00        11

       accuracy                           1.00        30
      macro avg       1.00      1.00      1.00        30
   weighted avg       1.00      1.00      1.00        30

Confusion Matrix:
 [[10  0  0]
 [ 0  9  0]
 [ 0  0 11]]
```


Decision Tree for Iris Dataset