AIM :

Program to implement decision trees using any standard dataset available in the public Domain and find the accuracy of the algorithm.

Program

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

from sklearn.preprocessing import LabelEncoder

from sklearn.model_selection import train_test_split

from sklearn.tree import DecisionTreeClassifier

from sklearn.metrics import classification_report, confusion_matrix

from sklearn.tree import plot_tree

df = sns.load_dataset('iris')
print(df.head())
print(df.info())
df.isnull().any()
print(df.shape)
# Let's plot pair plot to visualise the attributes all at once
sns.pairplot(data=df, hue="species")
plt.savefig('pne.png')
# Correction matrix
sns.heatmap(df.corr())
plt.savefig('one.png')

target = df['species']
df1 = df.copy()
df1 = df1.drop('species', axis=1)
print(df1.shape)
print(df1.head())
# Defining the attributes
x = df1
```

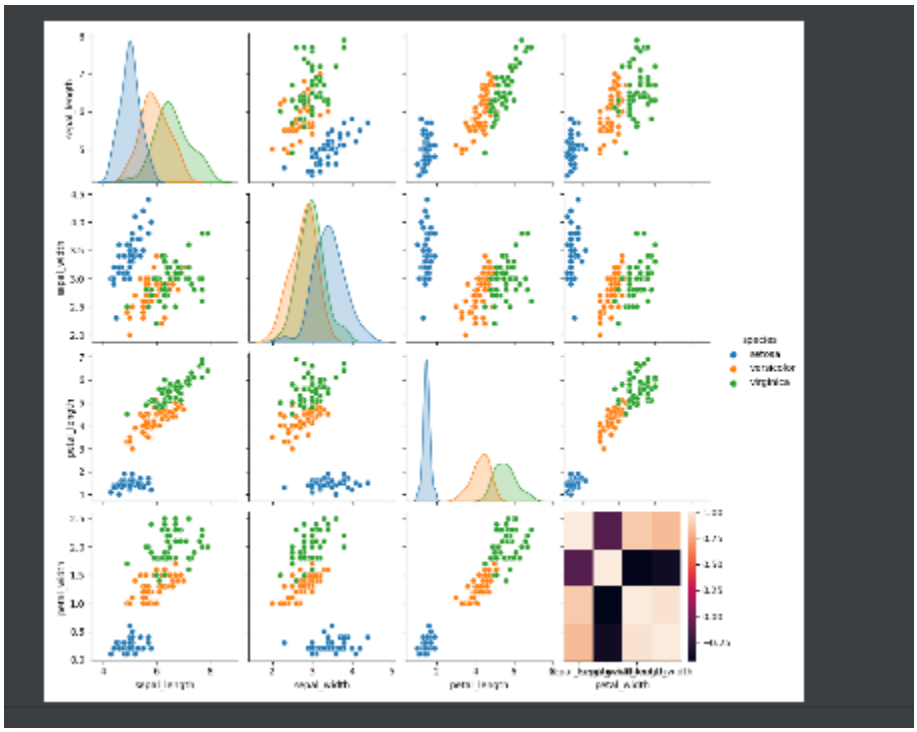
```
print(target)
# label encoding
le = LabelEncoder()
target = le.fit_transform(target)
print(target)
y = target
X_train, X_test, y_train, y_test = train_test_split(x, y, test_size=0.2, random_state=42)

print("Training split input- ", X_train.shape)
print("Testing split input- ", X_test.shape)
# Defining the decision tree algorithm
dtree = DecisionTreeClassifier()
dtree.fit(X_train, y_train)

print('Decision Tree Classifier Created')
y_pred = dtree.predict(X_test)
print('Classification report - \n', classification_report(y_test, y_pred))
cm = confusion_matrix(y_test, y_pred)
plt.figure(figsize=(5, 5))
sns.heatmap(data=cm, linewidth=.5, annot=True, square=True, cmap='Blues')
plt.ylabel('Actual label')
plt.xlabel('Predicted label')
all_sample_title = 'Accuracy score: {0}'.format(X_test, y_test)
plt.title(all_sample_title, size=15)
plt.savefig('two.png')

plt.figure(figsize=(20, 20))
dec_tree = plot_tree(decision_tree=dtree, feature_names=df1.columns,
                     class_names=['setosa', 'vercicolor', 'verginica'], filled=True, precision=4,
rounded=True)

plt.savefig('tree.png')
```

Output

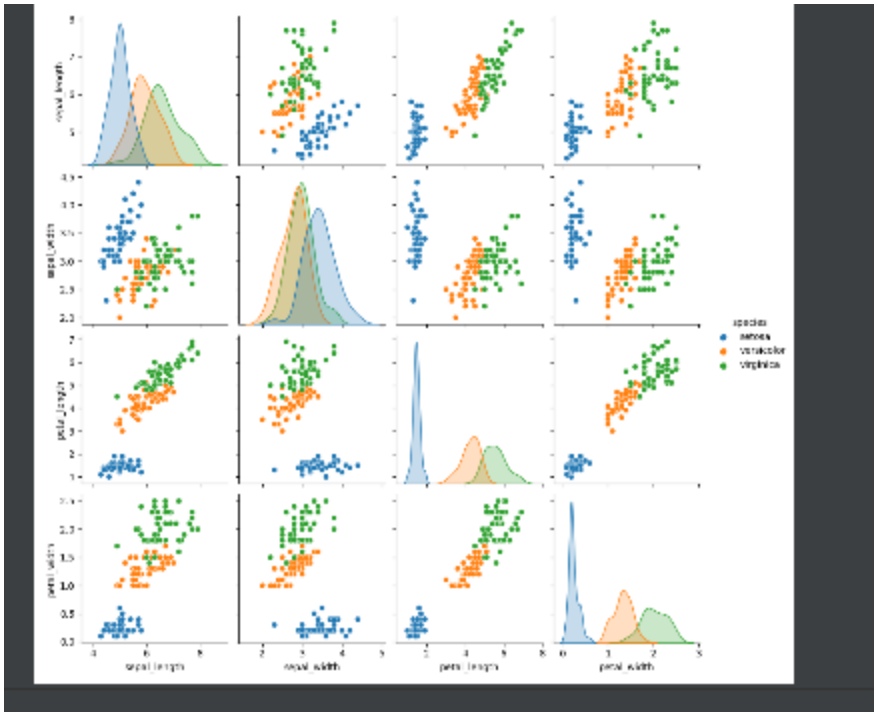
```
"C:\Users\aksa\PycharmProjects\add number\venv\Scripts\python.exe"
"C:/Users/aksa/PycharmProjects/add number/dt2.py"
   sepal_length  sepal_width  petal_length  petal_width species
0           5.1          3.5           1.4          0.2  setosa
1           4.9          3.0           1.4          0.2  setosa
2           4.7          3.2           1.3          0.2  setosa
3           4.6          3.1           1.5          0.2  setosa
4           5.0          3.6           1.4          0.2  setosa
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 150 entries, 0 to 149
Data columns (total 5 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   sepal_length  150 non-null    float64
 1   sepal_width   150 non-null    float64
 2   petal_length  150 non-null    float64
 3   petal_width   150 non-null    float64
 4   species       150 non-null    object
dtypes: float64(4), object(1)
memory usage: 6.0+ KB
None
(150, 5)
(150, 4)
   sepal_length  sepal_width  petal_length  petal_width
0           5.1          3.5           1.4          0.2
1           4.9          3.0           1.4          0.2
2           4.7          3.2           1.3          0.2
3           4.6          3.1           1.5          0.2
4           5.0          3.6           1.4          0.2
0         setosa
1         setosa
2         setosa
3         setosa
4         setosa
         ...
145    virginica
146    virginica
147    virginica
148    virginica
149    virginica
Name: species, Length: 150, dtype: object
[0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2
 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
```

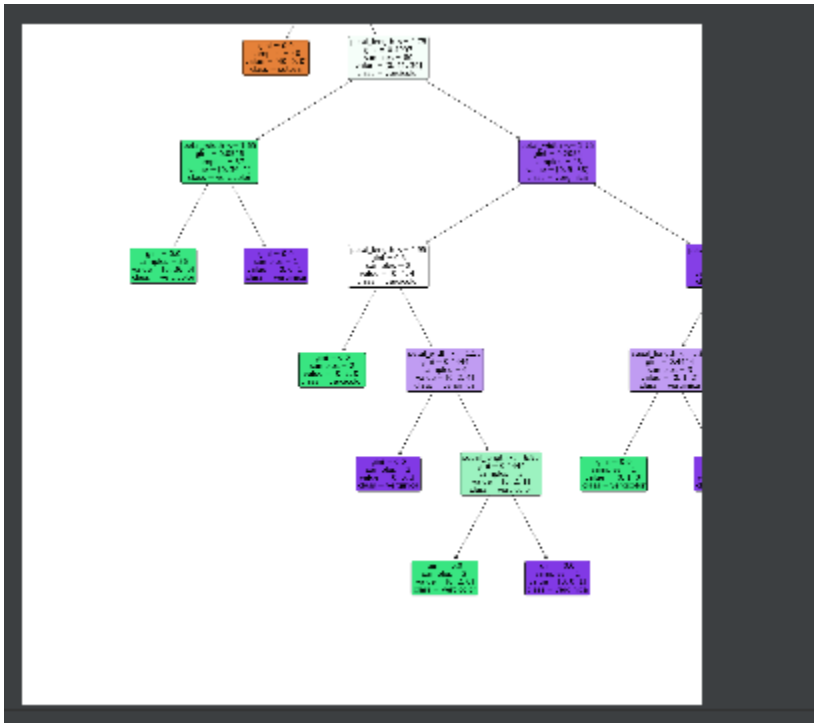
One.png



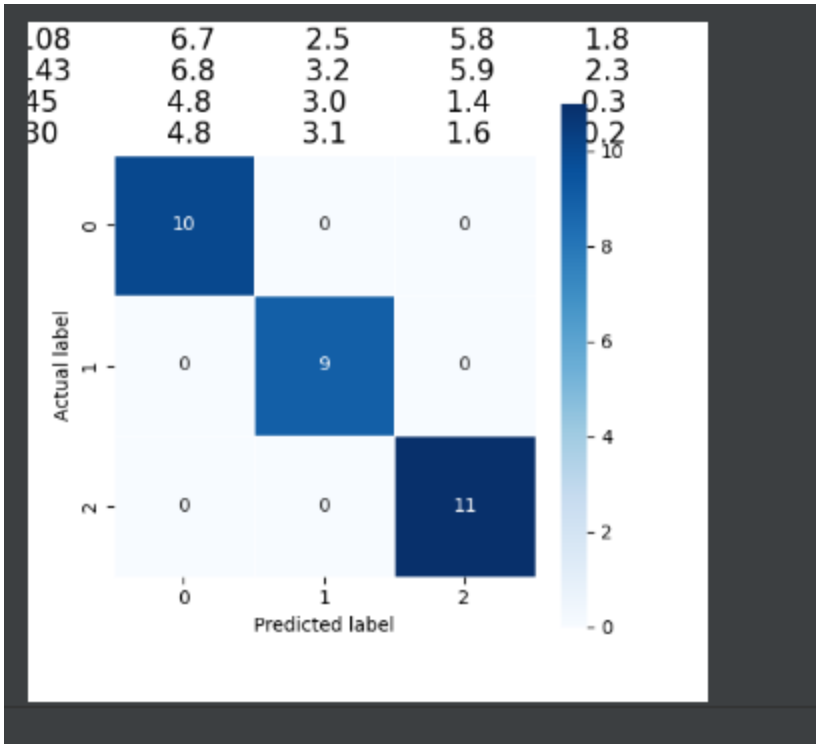
Pne.png



Tree.png



Two.png


.08 6.7 2.5 5.8 1.8
.43 6.8 3.2 5.9 2.3
45 4.8 3.0 1.4 0.3
30 4.8 3.1 1.6 0.2
10
0
0
0
9
0
0
0
11
0
1
2
Actual label
Predicted label
10
8
6
4
2
0