PROGRAM NO : 11

AIM : Program to implement Decision Tree using any standard dataset available in the public domain and find the accuracy of the algorithm

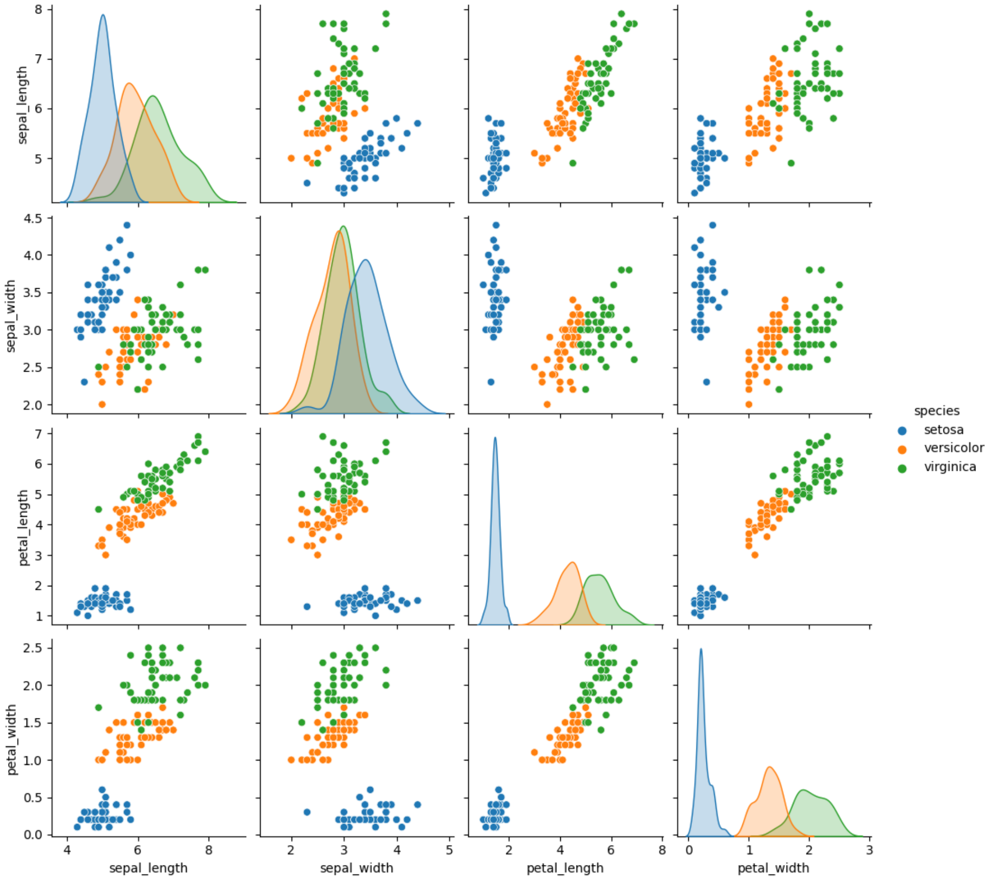
PROGRAM

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

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)

sns.pairplot(data=df,hue='species')
plt.savefig("decison_tree.png")

#correlation 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 attribute
x=df1;
print(target)

#label encoding
le=LabelEncoder()
target=le.fit_transform(target)
print(target)

y=target
```

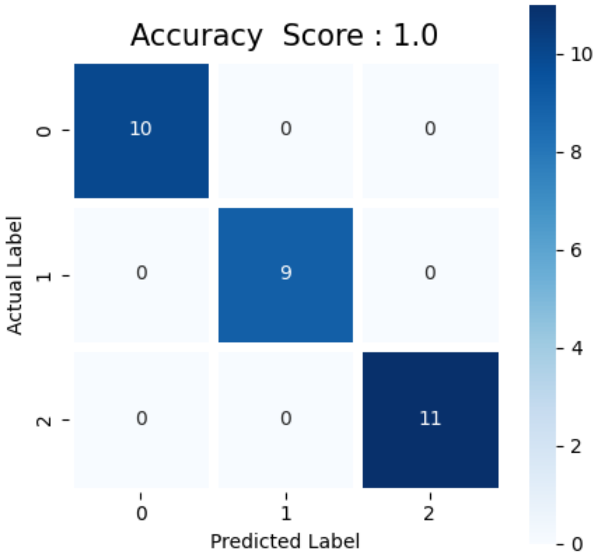
```
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.2,random_state=42)

print('Training split input- ',x_train.shape)
print('testing split input- ',x_test.shape)

#Defing the Decision tree algorithm
dtree=DecisionTreeClassifier()
dtree.fit(x_train,y_train)

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(dtree.score(x_test,y_test))
plt.title(all_sample_title,size= 15)

plt.savefig("2.png")

#visualizong the graph without the use of graphics



plt.figure(figsize=(20,20))
dec_tre=plot_tree(decision_tree=dtree,feature_names=df1.columns,class_names=["satosa","vercicolor","venginica"],filled=True,precision=4,rounded=True)

plt.savefig("3.png")
```

OUTPUT

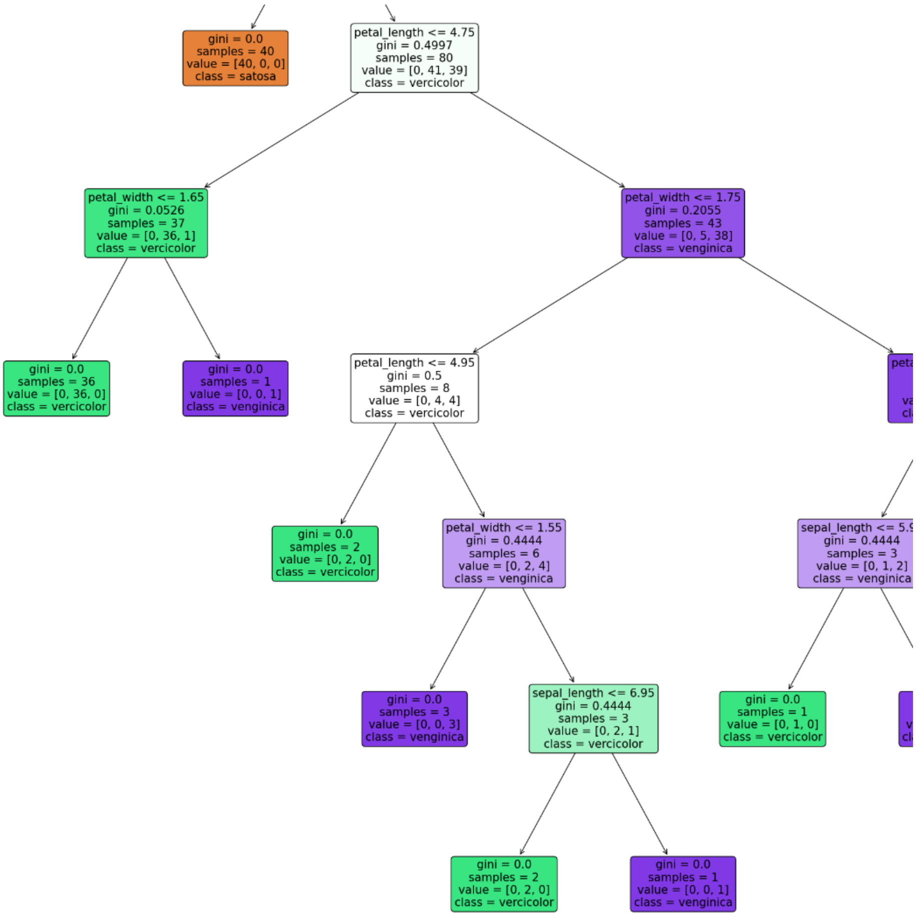
1.png

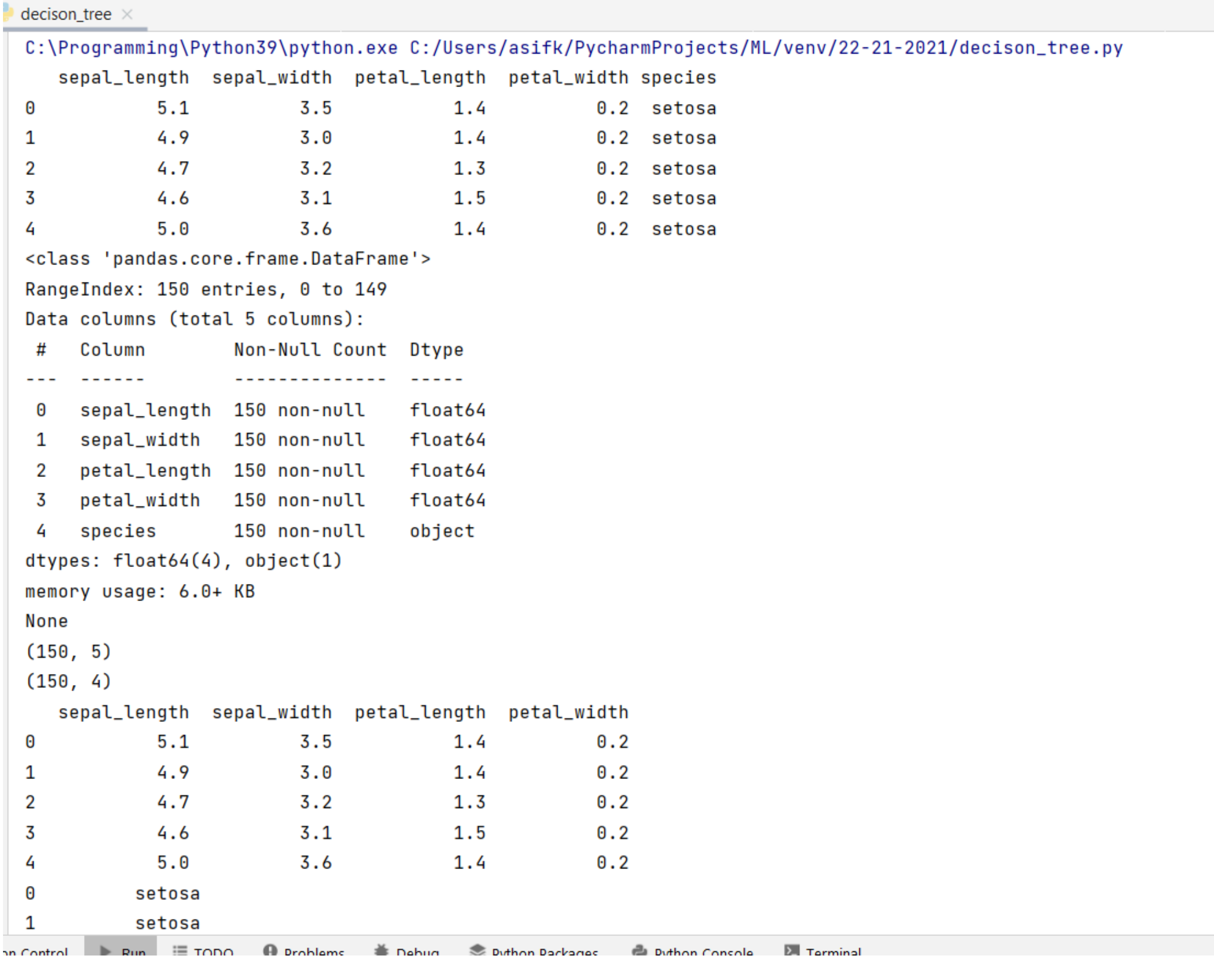


2.png

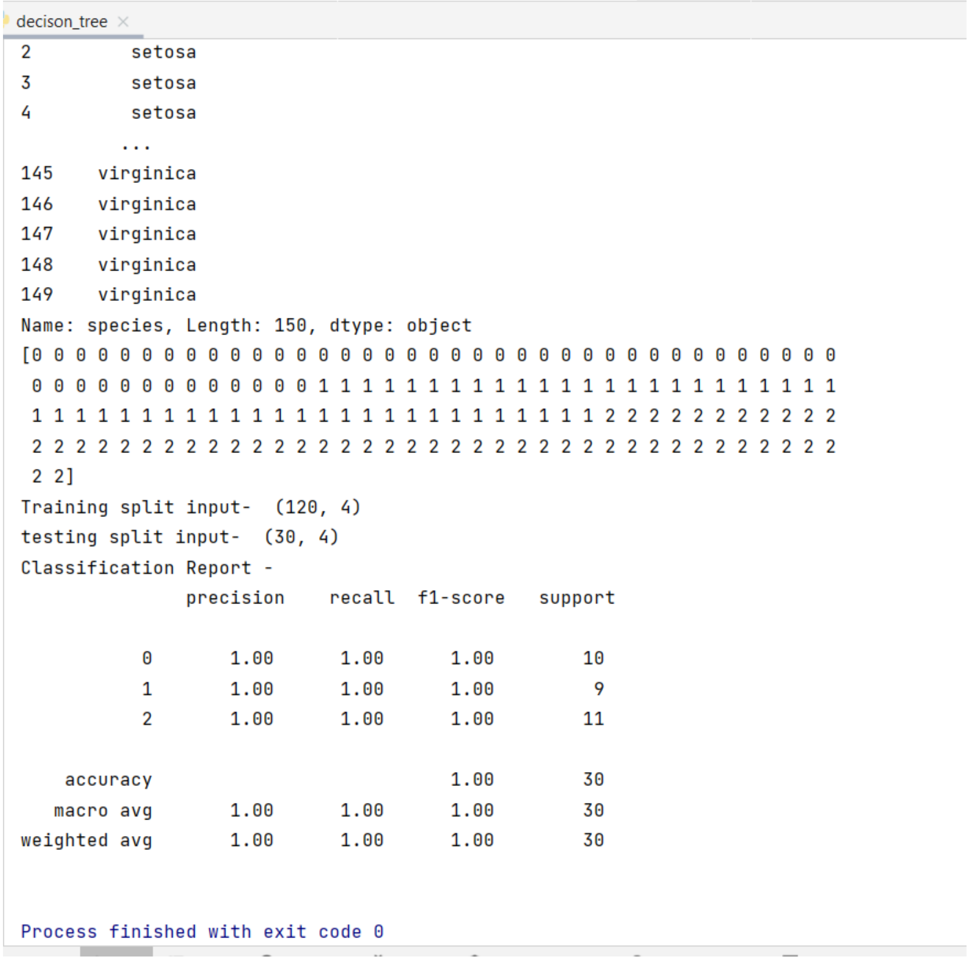


3.png


gini = 0.0
samples = 40
value = [40, 0, 0]
class = satosa
petal_length <= 4.75
gini = 0.4997
samples = 80
value = [0, 41, 39]
class = vercicolor
petal_width <= 1.65
gini = 0.0526
samples = 37
value = [0, 36, 1]
class = vercicolor
petal_width <= 1.75
gini = 0.2055
samples = 43
value = [0, 5, 38]
class = venginica
gini = 0.0
samples = 36
value = [0, 36, 0]
class = vercicolor
gini = 0.0
samples = 1
value = [0, 0, 1]
class = venginica
petal_length <= 4.95
gini = 0.5
samples = 8
value = [0, 4, 4]
class = vercicolor
peta
va
cl
gini = 0.0
samples = 2
value = [0, 2, 0]
class = vercicolor
petal_width <= 1.55
gini = 0.4444
samples = 6
value = [0, 2, 4]
class = venginica
sepal_length <= 5.9
gini = 0.4444
samples = 3
value = [0, 1, 2]
class = venginica
gini = 0.0
samples = 3
value = [0, 0, 3]
class = venginica
sepal_length <= 6.95
gini = 0.4444
samples = 3
value = [0, 2, 1]
class = vercicolor
gini = 0.0
samples = 1
value = [0, 1, 0]
class = vercicolor
v
cl
gini = 0.0
samples = 2
value = [0, 2, 0]
class = vercicolor
gini = 0.0
samples = 1
value = [0, 0, 1]
class = venginica



```
C:\Programming\Python39\python.exe C:/Users/asifk/PycharmProjects/ML/venv/22-21-2021/decison_tree.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
 2 2]
Training split input-  (120, 4)
testing split input-  (30, 4)
Classification Report -
               precision    recall  f1-score   support

           0       1.00      1.00      1.00        10
           1       1.00      1.00      1.00         9
           2       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


Process finished with exit code 0
```