Let's Grow More Data Science Internship

Task :- 03

Task Name :- Prediction Using Decision Tree Algorithm

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IMPORTING LIBRARIES

In [1]:

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

LOADING DATASET

In [2]:

```
df = sns.load_dataset('iris')
df
```

Out[2]:

	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
...	...	...	...	...	...
145	6.7	3.0	5.2	2.3	virginica
146	6.3	2.5	5.0	1.9	virginica
147	6.5	3.0	5.2	2.0	virginica
148	6.2	3.4	5.4	2.3	virginica
149	5.9	3.0	5.1	1.8	virginica

150 rows × 5 columns

CHECKING MISSING VALUES

In [3]:

```
df.isnull().sum()
```

Out[3]:

```
sepal_length    0
sepal_width     0
petal_length    0
petal_width     0
species         0
dtype: int64
```

DATA SEPARATION

In [4]:

```
x = df.iloc[:,0:4]
x
```

Out[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
...	...	...	...	...
145	6.7	3.0	5.2	2.3
146	6.3	2.5	5.0	1.9
147	6.5	3.0	5.2	2.0
148	6.2	3.4	5.4	2.3
149	5.9	3.0	5.1	1.8

150 rows × 4 columns

In [5]:

```
y = df.iloc[:,4]
y
```

Out[5]:

```
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
```

TRAIN TEST SPLIT

In [6]:

```
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test = train_test_split(x,y,test_size = 0.2,random_state = 101)
x_train
```

Out[6]:

	sepal_length	sepal_width	petal_length	petal_width
104	6.5	3.0	5.8	2.2
89	5.5	2.5	4.0	1.3
116	6.5	3.0	5.5	1.8
82	5.8	2.7	3.9	1.2
112	6.8	3.0	5.5	2.1
...	...	...	...	...
63	6.1	2.9	4.7	1.4
70	5.9	3.2	4.8	1.8
81	5.5	2.4	3.7	1.0
11	4.8	3.4	1.6	0.2
95	5.7	3.0	4.2	1.2

120 rows × 4 columns

DECISION TREE CLASSIFIER

In [7]:

```
from sklearn.tree import DecisionTreeClassifier
from sklearn.metrics import accuracy_score
```

In [8]:

```
df = DecisionTreeClassifier()
df.fit(x_train,y_train)
y_predict = df.predict(x_test)
y_predict
```

Out[8]:

```
array(['setosa', 'setosa', 'setosa', 'versicolor', 'versicolor',
       'virginica', 'versicolor', 'versicolor', 'virginica', 'setosa',
       'virginica', 'setosa', 'setosa', 'virginica', 'virginica',
       'versicolor', 'versicolor', 'versicolor', 'setosa', 'virginica',
       'versicolor', 'setosa', 'versicolor', 'versicolor', 'versicolor',
       'versicolor', 'versicolor', 'virginica', 'setosa', 'setosa'],
      dtype=object)
```

ACCURACY SCORE

In [9]:

```
accuracy_score(y_test,y_predict)
```

Out[9]:

```
0.9666666666666667
```

CONFUSION MATRIX

In [10]:

```
from sklearn.metrics import confusion_matrix
cm = confusion_matrix(y_test,y_predict)
cm
```

Out[10]:

```
array([[10,  0,  0],
       [ 0, 12,  0],
       [ 0,  1,  7]], dtype=int64)
```

CLASSIFICATION REPORT

In [11]:

```
from sklearn.metrics import classification_report
print(classification_report(y_test,y_predict))
```

```
              precision    recall  f1-score   support

      setosa       1.00      1.00      1.00        10
  versicolor       0.92      1.00      0.96        12
   virginica       1.00      0.88      0.93         8

    accuracy                           0.97        30
   macro avg       0.97      0.96      0.96        30
weighted avg       0.97      0.97      0.97        30
```

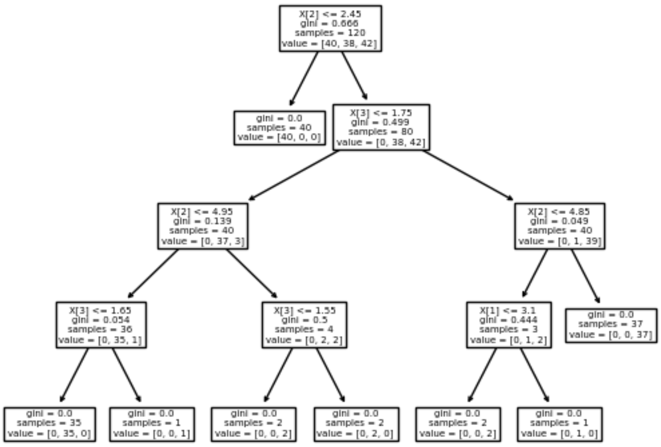
DECISION TREE PLOT

In [12]:

```
from sklearn import tree
tree.plot_tree(df)
```

Out[12]:

```
[Text(0.5, 0.9, 'X[2] <= 2.45\ngini = 0.666\nsamples = 120\nvalue = [40, 38, 42]'),
 Text(0.4230769230769231, 0.7, 'gini = 0.0\nsamples = 40\nvalue = [40, 0, 0]'),
 Text(0.5769230769230769, 0.7, 'X[3] <= 1.75\ngini = 0.499\nsamples = 80\nvalue = [0, 38, 42]'),
 Text(0.3076923076923077, 0.5, 'X[2] <= 4.95\ngini = 0.139\nsamples = 40\nvalue = [0, 37, 3]'),
 Text(0.15384615384615385, 0.3, 'X[3] <= 1.65\ngini = 0.054\nsamples = 36\nvalue = [0, 35, 1]'),
 Text(0.07692307692307693, 0.1, 'gini = 0.0\nsamples = 35\nvalue = [0, 35, 0]'),
 Text(0.23076923076923078, 0.1, 'gini = 0.0\nsamples = 1\nvalue = [0, 0, 1]'),
 Text(0.46153846153846156, 0.3, 'X[3] <= 1.55\ngini = 0.5\nsamples = 4\nvalue = [0, 2, 2]'),
 Text(0.38461538461538464, 0.1, 'gini = 0.0\nsamples = 2\nvalue = [0, 0, 2]'),
 Text(0.5384615384615384, 0.1, 'gini = 0.0\nsamples = 2\nvalue = [0, 2, 0]'),
 Text(0.8461538461538461, 0.5, 'X[2] <= 4.85\ngini = 0.049\nsamples = 40\nvalue = [0, 1, 39]'),
 Text(0.7692307692307693, 0.3, 'X[1] <= 3.1\ngini = 0.444\nsamples = 3\nvalue = [0, 1, 2]'),
 Text(0.6923076923076923, 0.1, 'gini = 0.0\nsamples = 2\nvalue = [0, 0, 2]'),
 Text(0.8461538461538461, 0.1, 'gini = 0.0\nsamples = 1\nvalue = [0, 1, 0]'),
 Text(0.9230769230769231, 0.3, 'gini = 0.0\nsamples = 37\nvalue = [0, 0, 37]')]
```


X[2] <= 2.45 gini = 0.666 samples = 120 value = [40, 38, 42]
gini = 0.0 samples = 40 value = [40, 0, 0]
X[3] <= 1.75 gini = 0.499 samples = 80 value = [0, 38, 42]
X[2] <= 4.95 gini = 0.139 samples = 40 value = [0, 37, 3]
X[2] <= 4.85 gini = 0.049 samples = 40 value = [0, 1, 39]
X[3] <= 1.65 gini = 0.054 samples = 36 value = [0, 35, 1]
X[3] <= 1.55 gini = 0.5 samples = 4 value = [0, 2, 2]
X[1] <= 3.1 gini = 0.444 samples = 3 value = [0, 1, 2]
gini = 0.0 samples = 37 value = [0, 0, 37]
gini = 0.0 samples = 35 value = [0, 35, 0]
gini = 0.0 samples = 1 value = [0, 0, 1]
gini = 0.0 samples = 2 value = [0, 0, 2]
gini = 0.0 samples = 2 value = [0, 2, 0]
gini = 0.0 samples = 2 value = [0, 0, 2]
gini = 0.0 samples = 1 value = [0, 1, 0]

CONCLUSION

I have performed Iris Flower Classification using Decison Tree Classifier. Accuracy of Decision Tree Classifier is 97%.

In [ ]: