```
#To implement Decision Tree algorithm using any  inbuild and external data set.
```

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
#for encoding
from sklearn.preprocessing import LabelEncoder#for train test splitting
from sklearn.model_selection import train_test_split#for decision tree object
from sklearn.tree import DecisionTreeClassifier#for checking testing results
from sklearn.metrics import classification_report, confusion_matrix#for visualizing tree
from sklearn.tree import plot_tree
```

```
#reading the data
df = sns.load_dataset('iris')
df.head()
```

	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

```
#getting information of dataset
df.info()
```

```
<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
```

```
df.shape
```

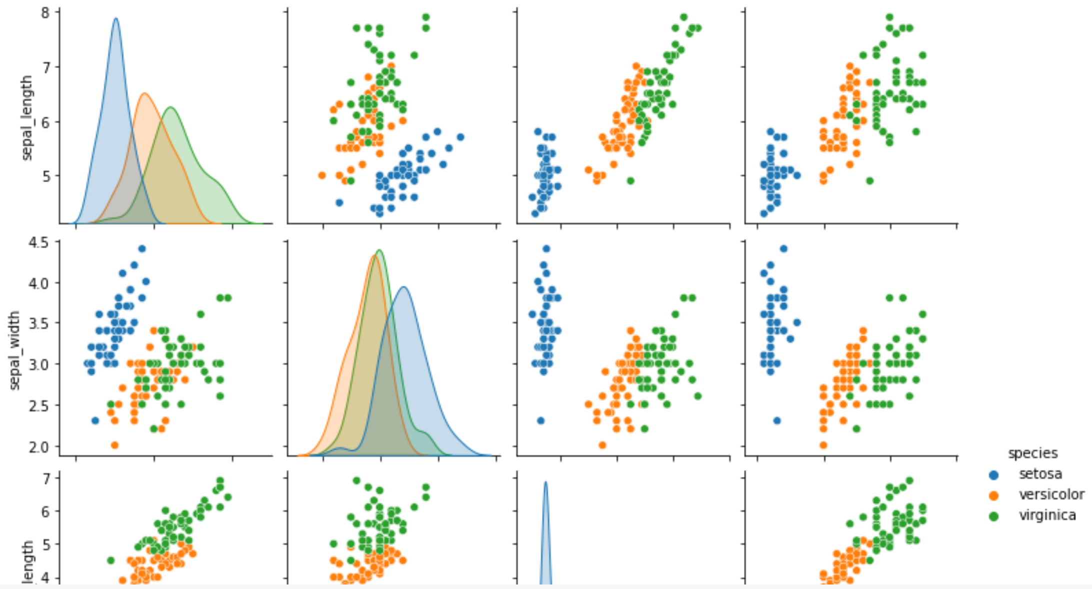
```
(150, 5)
```

```
df.isnull().any()
```

```
sepal_length    False
sepal_width     False
petal_length    False
petal_width     False
species         False
dtype: bool
```

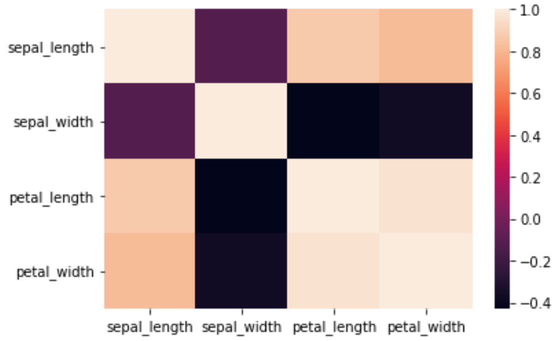
```
# let's plot pair plot to visualise the attributes all at once
sns.pairplot(data=df, hue = 'species')
```

```
<seaborn.axisgrid.PairGrid at 0x7f8555ec1a50>
```



```
# correlation matrix
sns.heatmap(df.corr())
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f8555a08dd0>
```



```
#we will separate the target variable(y) and features(X) as follows
target = df['species']
df1 = df.copy()
df1 = df1.drop('species', axis =1)
```

```
# Defining the attributes
X = df1
```

```
target
```

```
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
```

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

```
array([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])
```

```
y = target
```

```
# Splitting the data - 80:20 ratio
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)
```

```
Training split input-  (120, 4)
Testing split input-  (30, 4)
```

```
# Defining the decision tree algorithm
dtree=DecisionTreeClassifier()
dtree.fit(X_train,y_train)
print('Decision Tree Classifier Created')
```

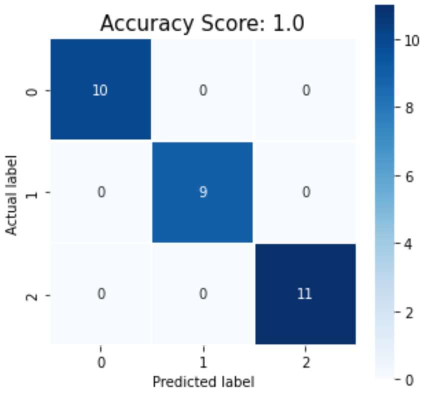
```
Decision Tree Classifier Created
```

```
# Predicting the values of test data
y_pred = dtree.predict(X_test)
print("Classification report - \n", classification_report(y_test,y_pred))
```

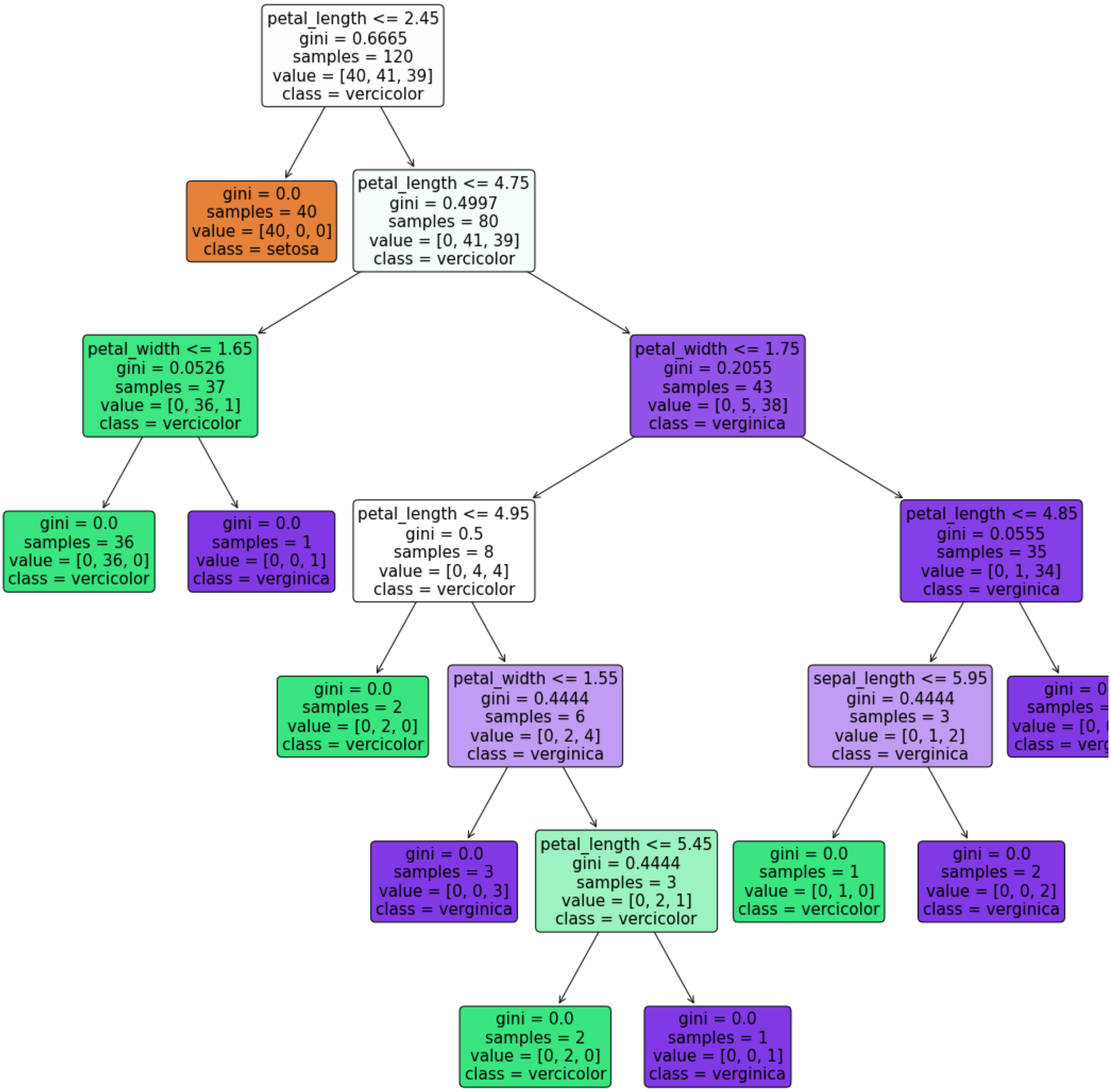
```
Classification report - 
               precision    recall  f1-score   support

           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
```

```
cm = confusion_matrix(y_test, y_pred)
plt.figure(figsize=(5,5))
sns.heatmap(data=cm,linewidths=.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)
```

```
Text(0.5, 1.0, 'Accuracy Score: 1.0')
```



```
# Visualising the graph without the use of graphviz
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)
```



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