```
from google.colab import drive
drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

```
from google.colab import files
uploaded = files.upload()
```

Choose Files No file chosen Upload widget is only available when the cell has been executed in the current browser session. Please rerun this cell to enable.

```
Saving iris.csv to iris.csv
```

```
import pandas as pd
iris = pd.read_csv('/content/iris.csv')
```

```
from matplotlib import pyplot as plt
import numpy as np
iris
```

	sepal.length	sepal.width	petal.length	petal.width	variety
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

```
iris.shape
```

```
(150, 5)
```

```
iris.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   variety       150 non-null    object 
dtypes: float64(4), object(1)
memory usage: 6.0+ KB
```

```
X = iris.iloc[ : , 0:4]
X
```

	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

```
Y = iris.iloc[ : , 4: ]
Y.variety.unique()
```

```
array(['Setosa', 'Versicolor', 'Virginica'], dtype=object)
```

```
from sklearn.model_selection import train_test_split

X_train, X_test, Y_train, Y_test = train_test_split(X , Y, test_size = 0.25, random_state = 5)
X_train
```

	sepal.length	sepal.width	petal.length	petal.width
40	5.0	3.5	1.3	0.3
115	6.4	3.2	5.3	2.3
142	5.8	2.7	5.1	1.9
69	5.6	2.5	3.9	1.1
17	5.1	3.5	1.4	0.3
...	...	...	...	...
8	4.4	2.9	1.4	0.2
73	6.1	2.8	4.7	1.2
144	6.7	3.3	5.7	2.5
118	7.7	2.6	6.9	2.3
99	5.7	2.8	4.1	1.3

112 rows × 4 columns

```
from sklearn.tree import DecisionTreeClassifier

clf = DecisionTreeClassifier(random_state = 1234, criterion = 'entropy')
clf.fit(X_train , Y_train)
```

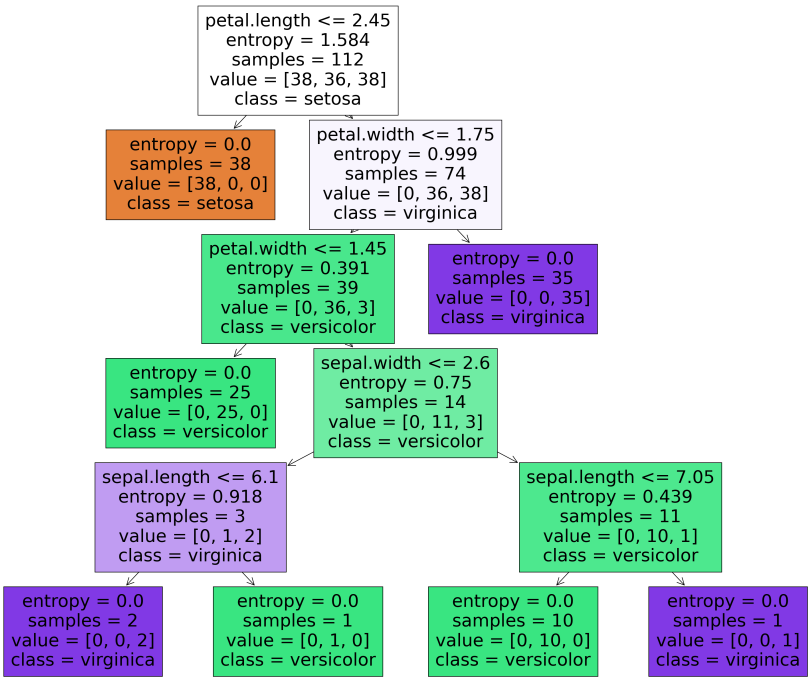
```
DecisionTreeClassifier
DecisionTreeClassifier(criterion='entropy', random_state=1234)
```

```
from sklearn import tree

text_representation = tree.export_text(clf)

print(text_representation)
```

```
|--- feature_2 <= 2.45
|   |--- class: Setosa
|--- feature_2 >  2.45
|   |--- feature_3 <= 1.75
|   |   |--- feature_3 <= 1.45
|   |   |   |--- class: Versicolor
|   |   |--- feature_3 >  1.45
|   |   |   |--- feature_1 <= 2.60
|   |   |   |   |--- feature_0 <= 6.10
|   |   |   |   |   |--- class: Virginica
|   |   |   |   |--- feature_0 >  6.10
```

```
|   |   |   |   |   |--- class: Versicolor
|   |   |   |--- feature_1 >  2.60
|   |   |   |   |--- feature_0 <= 7.05
|   |   |   |   |   |--- class: Versicolor
|   |   |   |   |--- feature_0 >  7.05
|   |   |   |   |   |--- class: Virginica
|   |--- feature_3 >  1.75
|   |   |--- class: Virginica
```

```
fig = plt.figure(figsize = (25 , 20) , dpi = 200.0)

_ = tree.plot_tree(clf,
                   feature_names = ['sepal.length' ,'sepal.width', 'petal.length', 'petal.width'],
                   class_names = ['setosa', 'versicolor', 'virginica'],
                   filled = True)
```



```
from sklearn.metrics import accuracy_score

pred_train = clf.predict(X_train)

accuracy_train = accuracy_score(Y_train, pred_train)

print('% of Accuracy on training data: ', accuracy_train * 100 )



# Let us test the accuracy of the model on the test data (or new data or unseen data).

pred_test = clf.predict(X_test)

accuracy_test = accuracy_score(Y_test, pred_test)

print('% of Accuracy on test data: ', accuracy_test * 100 )
```

```
% of Accuracy on training data:  100.0
% of Accuracy on test data:  92.10526315789474
```

Double-click (or enter) to edit

```
new_data = {'sepal.length' : [3.7],
            'sepal.width' :  [3.0],
            'petal.length' : [2.2],
            'petal.width' : [1.3] }

new_df = pd.DataFrame(new_data)

new_df.head()
```

	sepal.length	sepal.width	petal.length	petal.width
0	3.7	3.0	2.2	1.3