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In [151]:          'D:/CentennialWu/2020Fall/COMP309Data/Assignments/Lab08Wk10/
wk10DecisionTree_Liping.py'      ='D:/CentennialWu/2020Fall/COMP309Data/Assignments/
Lab08Wk10'
D:/CentennialWu/2020Fall/COMP309Data/Assignments/Lab08Wk10/iris.csv
Columns: ['Sepal.Length' 'Sepal.Width' 'Petal.Length' 'Petal.Width' 'Species']
Shape(rows and columns): (150, 5)
Describe:
        Sepal.Length  Sepal.Width  Petal.Length  Petal.Width
count    150.000000   150.000000    150.000000   150.000000
mean       5.843333     3.057333      3.758000     1.199333
std        0.828066     0.435866      1.765298     0.762238
min        4.300000     2.000000      1.000000     0.100000
25%        5.100000     2.800000      1.600000     0.300000
50%        5.800000     3.000000      4.350000     1.300000
75%        6.400000     3.300000      5.100000     1.800000
max        7.900000     4.400000      6.900000     2.500000
DataType:
 Sepal.Length    float64
Sepal.Width     float64
Petal.Length    float64
Petal.Width     float64
Species          object
dtype: object
First 5 rows:
    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
Unique Species:
 ['setosa' 'versicolor' 'virginica']
['Sepal.Length', 'Sepal.Width', 'Petal.Length', 'Petal.Width', 'Species']
['Sepal.Length', 'Sepal.Width', 'Petal.Length', 'Petal.Width']
Species
   Sepal.Length  Sepal.Width  Petal.Length  Petal.Width Species  is_train
0           5.1          3.5           1.4          0.2  setosa      True
1           4.9          3.0           1.4          0.2  setosa      True
2           4.7          3.2           1.3          0.2  setosa      True
3           4.6          3.1           1.5          0.2  setosa      True
4           5.0          3.6           1.4          0.2  setosa      True
dataframe train:
      Sepal.Length  Sepal.Width  Petal.Length  Petal.Width    Species  is_train
0              5.1          3.5           1.4          0.2     setosa      True
1              4.9          3.0           1.4          0.2     setosa      True
2              4.7          3.2           1.3          0.2     setosa      True
3              4.6          3.1           1.5          0.2     setosa      True
4              5.0          3.6           1.4          0.2     setosa      True
..             ...          ...           ...          ...        ...       ...
143            6.8          3.2           5.9          2.3  virginica      True
145            6.7          3.0           5.2          2.3  virginica      True
146            6.3          2.5           5.0          1.9  virginica      True
147            6.5          3.0           5.2          2.0  virginica      True
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149           5.9          3.0           5.1          1.8  virginica      True

[118 rows x 6 columns]
dataframe test:
      Sepal.Length  Sepal.Width  Petal.Length  Petal.Width     Species  \
7              5.0          3.4           1.5          0.2      setosa
9              4.9          3.1           1.5          0.1      setosa
10             5.4          3.7           1.5          0.2      setosa
16             5.4          3.9           1.3          0.4      setosa
18             5.7          3.8           1.7          0.3      setosa
26             5.0          3.4           1.6          0.4      setosa
34             4.9          3.1           1.5          0.2      setosa
35             5.0          3.2           1.2          0.2      setosa
41             4.5          2.3           1.3          0.3      setosa
44             5.1          3.8           1.9          0.4      setosa
55             5.7          2.8           4.5          1.3  versicolor
60             5.0          2.0           3.5          1.0  versicolor
66             5.6          3.0           4.5          1.5  versicolor
69             5.6          2.5           3.9          1.1  versicolor
73             6.1          2.8           4.7          1.2  versicolor
89             5.5          2.5           4.0          1.3  versicolor
90             5.5          2.6           4.4          1.2  versicolor
94             5.6          2.7           4.2          1.3  versicolor
97             6.2          2.9           4.3          1.3  versicolor
104            6.5          3.0           5.8          2.2   virginica
105            7.6          3.0           6.6          2.1   virginica
111            6.4          2.7           5.3          1.9   virginica
112            6.8          3.0           5.5          2.1   virginica
115            6.4          3.2           5.3          2.3   virginica
116            6.5          3.0           5.5          1.8   virginica
117            7.7          3.8           6.7          2.2   virginica
123            6.3          2.7           4.9          1.8   virginica
126            6.2          2.8           4.8          1.8   virginica
127            6.1          3.0           4.9          1.8   virginica
140            6.7          3.1           5.6          2.4   virginica
144            6.7          3.3           5.7          2.5   virginica
148            6.2          3.4           5.4          2.3   virginica

     is_train
7       False
9       False
10      False
16      False
18      False
26      False
34      False
35      False
41      False
44      False
55      False
60      False
66      False
69      False
73      False
89      False
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90      False
94      False
97      False
104     False
105     False
111     False
112     False
115     False
116     False
117     False
123     False
126     False
127     False
140     False
144     False
148     False
Number of observations in the training data: 118
Number of observations in the test data: 32
***********Max_depth=1*************************
max_depth=1, score:  0.575
['setosa' 'versicolor' 'virginica']
Accuracy: 0.6333333333333333
Confusion matrix
 [[ 9  0  0]
 [ 0  0 11]
 [ 0  0 10]]
C:\Users\foxpe\anaconda3\lib\site-packages\sklearn\utils\validation.py:68: FutureWarning:
Pass labels=['setosa' 'versicolor' 'virginica'] as keyword args. From version 0.25 passing
these as positional arguments will result in an error
  warnings.warn("Pass {} as keyword args. From version 0.25 "
***********Max_depth=2*************************
max_depth=2, score:  0.9333333333333333
['setosa' 'versicolor' 'virginica']
Accuracy: 0.9
Confusion matrix
 [[ 9  0  0]
 [ 0 10  1]
 [ 0  2  8]]
C:\Users\foxpe\anaconda3\lib\site-packages\sklearn\utils\validation.py:68: FutureWarning:
Pass labels=['setosa' 'versicolor' 'virginica'] as keyword args. From version 0.25 passing
these as positional arguments will result in an error
  warnings.warn("Pass {} as keyword args. From version 0.25 "
***********Max_depth=3*************************
max_depth=3, score:  0.9416666666666667
['setosa' 'versicolor' 'virginica']
Accuracy: 0.9
Confusion matrix
 [[ 9  0  0]
 [ 0 10  1]
 [ 0  2  8]]
C:\Users\foxpe\anaconda3\lib\site-packages\sklearn\utils\validation.py:68: FutureWarning:
Pass labels=['setosa' 'versicolor' 'virginica'] as keyword args. From version 0.25 passing
these as positional arguments will result in an error
  warnings.warn("Pass {} as keyword args. From version 0.25 "
C:\Users\foxpe\anaconda3\lib\site-packages\sklearn\utils\validation.py:68: FutureWarning:
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Pass labels=['setosa' 'versicolor' 'virginica'] as keyword args. From version 0.25 passing
these as positional arguments will result in an error
  warnings.warn("Pass {} as keyword args. From version 0.25 "
**********Max_depth=4**********
max_depth=4, score:  0.9416666666666667
['setosa' 'versicolor' 'virginica']
Accuracy: 0.9
Confusion matrix
 [[ 9  0  0]
 [ 0 10  1]
 [ 0  2  8]]
C:\Users\foxpe\anaconda3\lib\site-packages\sklearn\utils\validation.py:68: FutureWarning:
Pass labels=['setosa' 'versicolor' 'virginica'] as keyword args. From version 0.25 passing
these as positional arguments will result in an error
  warnings.warn("Pass {} as keyword args. From version 0.25 "
**********Max_depth=5**********
max_depth=5, score:  0.9416666666666667
['setosa' 'versicolor' 'virginica']
Accuracy: 0.9
Confusion matrix
 [[ 9  0  0]
 [ 0 10  1]
 [ 0  2  8]]
**********Max_depth=6**********
max_depth=6, score:  0.9416666666666667
['setosa' 'versicolor' 'virginica']
Accuracy: 0.9
Confusion matrix
 [[ 9  0  0]
 [ 0 10  1]
 [ 0  2  8]]
C:\Users\foxpe\anaconda3\lib\site-packages\sklearn\utils\validation.py:68: FutureWarning:
Pass labels=['setosa' 'versicolor' 'virginica'] as keyword args. From version 0.25 passing
these as positional arguments will result in an error
  warnings.warn("Pass {} as keyword args. From version 0.25 "
C:\Users\foxpe\anaconda3\lib\site-packages\sklearn\utils\validation.py:68: FutureWarning:
Pass labels=['setosa' 'versicolor' 'virginica'] as keyword args. From version 0.25 passing
these as positional arguments will result in an error
  warnings.warn("Pass {} as keyword args. From version 0.25 "
**********Max_depth=7**********
max_depth=7, score:  0.9416666666666667
['setosa' 'versicolor' 'virginica']
Accuracy: 0.9
Confusion matrix
 [[ 9  0  0]
 [ 0 10  1]
 [ 0  2  8]]
**********Max_depth=8**********
max_depth=8, score:  0.9416666666666667
['setosa' 'versicolor' 'virginica']
Accuracy: 0.9
Confusion matrix
 [[ 9  0  0]
 [ 0 10  1]
 [ 0  2  8]]
```

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C:\Users\foxpe\anaconda3\lib\site-packages\sklearn\utils\validation.py:68: FutureWarning:
Pass labels=['setosa' 'versicolor' 'virginica'] as keyword args. From version 0.25 passing
these as positional arguments will result in an error
  warnings.warn("Pass {} as keyword args. From version 0.25 "
C:\Users\foxpe\anaconda3\lib\site-packages\sklearn\utils\validation.py:68: FutureWarning:
Pass labels=['setosa' 'versicolor' 'virginica'] as keyword args. From version 0.25 passing
these as positional arguments will result in an error
  warnings.warn("Pass {} as keyword args. From version 0.25 "
**********Max_depth=9**********
max_depth=9, score:  0.9416666666666667
['setosa' 'versicolor' 'virginica']
Accuracy: 0.9
Confusion matrix
 [[ 9  0  0]
 [ 0 10  1]
 [ 0  2  8]]
C:\Users\foxpe\anaconda3\lib\site-packages\sklearn\utils\validation.py:68: FutureWarning:
Pass labels=['setosa' 'versicolor' 'virginica'] as keyword args. From version 0.25 passing
these as positional arguments will result in an error
  warnings.warn("Pass {} as keyword args. From version 0.25 "
**********Max_depth=10**********
max_depth=10, score:  0.9416666666666667
['setosa' 'versicolor' 'virginica']
Accuracy: 0.9
Confusion matrix
 [[ 9  0  0]
 [ 0 10  1]
 [ 0  2  8]]
```

In [152]: