In [4]:

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

In [5]:

```
col_names  =  ['Sepal_Length','Sepal_Width','Petal_Length','Petal_Width','Species']
```

In [6]:

```
iris  =  pd.read_csv('C:/Users/Lenovo/Downloads/iris.csv',names=col_names)
```

In [7]:

```
iris
```

Out[7]:

	Sepal_Length	Sepal_Width	Petal_Length	Petal_Width	Species
0	5.1	3.5	1.4	0.2	Iris-setosa
1	4.9	3.0	1.4	0.2	Iris-setosa
2	4.7	3.2	1.3	0.2	Iris-setosa
3	4.6	3.1	1.5	0.2	Iris-setosa
4	5.0	3.6	1.4	0.2	Iris-setosa
...	...	...	...	...	...
145	6.7	3.0	5.2	2.3	Iris-virginica
146	6.3	2.5	5.0	1.9	Iris-virginica
147	6.5	3.0	5.2	2.0	Iris-virginica
148	6.2	3.4	5.4	2.3	Iris-virginica
149	5.9	3.0	5.1	1.8	Iris-virginica

150 rows × 5 columns

In [8]:

```
len(list(iris))
```

Out[8]:

```
5
```

In [9]:

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

In [10]:

```
np.unique(iris["Species"])
```

Out[10]:

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

In [11]:

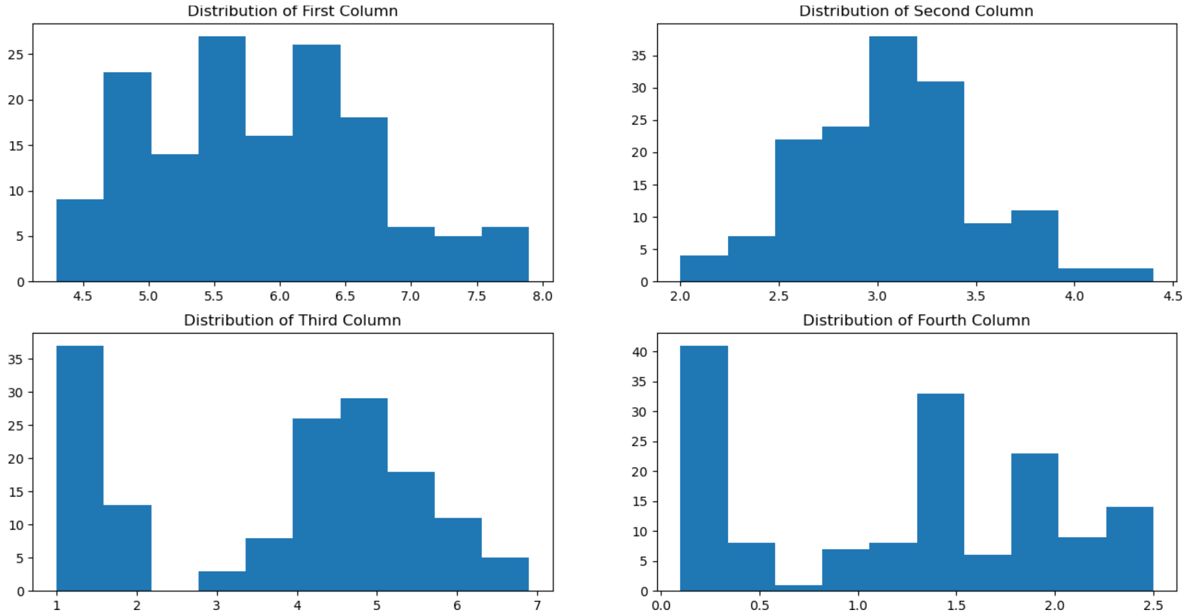
```
iris.describe()
```

Out[11]:

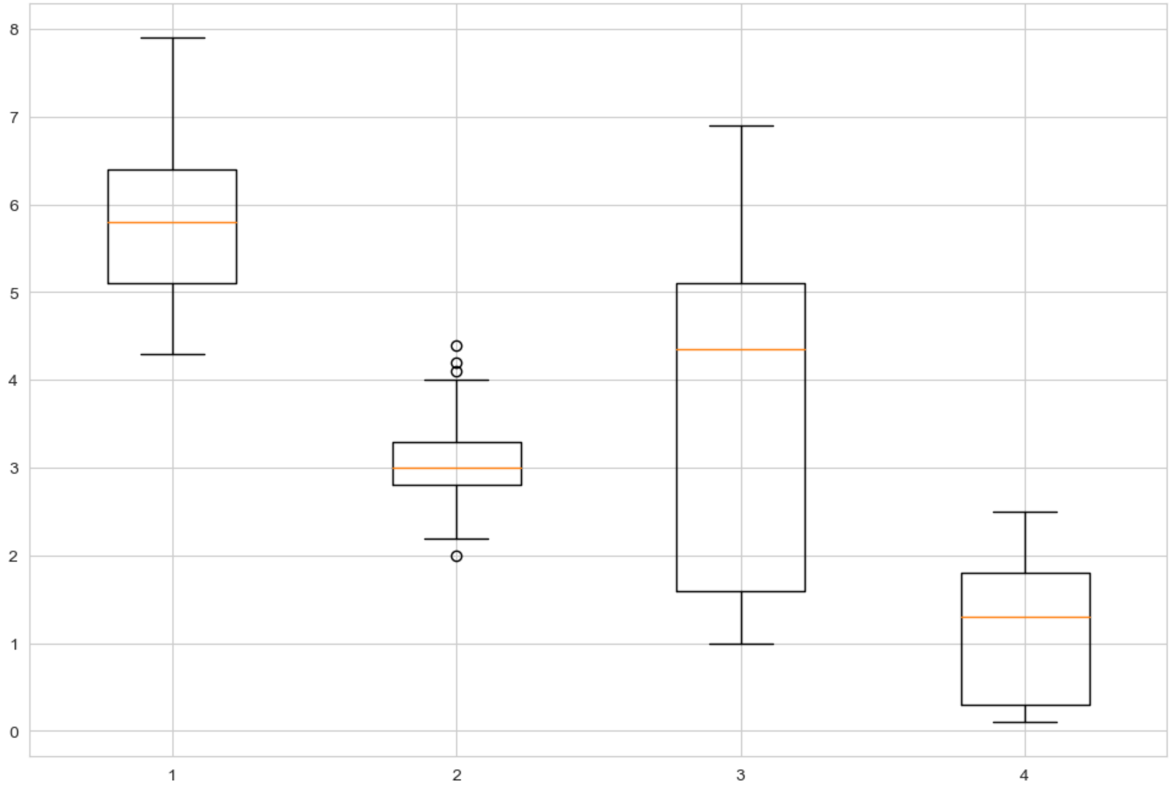
	Sepal_Length	Sepal_Width	Petal_Length	Petal_Width
count	150.000000	150.000000	150.000000	150.000000
mean	5.843333	3.054000	3.758667	1.198667
std	0.828066	0.433594	1.764420	0.763161
min	4.300000	2.000000	1.000000	0.100000
25%	5.100000	2.800000	1.600000	0.300000
50%	5.800000	3.000000	4.350000	1.300000
75%	6.400000	3.300000	5.100000	1.800000
max	7.900000	4.400000	6.900000	2.500000

In [12]:
```
import matplotlib.pyplot as plt
%matplotlib inline
```

In [13]:
```
fig, axes = plt.subplots(2, 2, figsize=(16, 8))
axes[0,0].set_title("Distribution of First Column")
axes[0,0].hist(iris["Sepal_Length"]);
axes[0,1].set_title("Distribution of Second Column")
axes[0,1].hist(iris["Sepal_Width"]);
axes[1,0].set_title("Distribution of Third Column")
axes[1,0].hist(iris["Petal_Length"]);
axes[1,1].set_title("Distribution of Fourth Column")
axes[1,1].hist(iris["Petal_Width"]);
```



In [14]:
```
data_to_plot = [iris["Sepal_Length"],iris["Sepal_Width"],iris["Petal_Length"],iris
sns.set_style("whitegrid")

fig = plt.figure(1,

figsize=(12,8)) ax =

fig.add_subplot(111)
```



In [15]:
```
from scipy import stats
```

In [16]:
```
z = np.abs(stats.zscore(iris['Sepal_Length']))
```

In [17]:
```
print(z)
```

```
0      0.900681
1      1.143017
2      1.385353
3      1.506521
4      1.021849
         ...
145    1.038005
146    0.553333
147    0.795669
148    0.432165
149    0.068662
Name: Sepal_Length, Length: 150, dtype:
      float64
```

In [18]:
```
threshold = 0.5
```

In [19]:
```
sample_outliers = np.where(z <threshold)
sample_outliers
```

Out[19]:
```
(array([ 14,  15,  18,  33,  36,  53,  55,  61,  62,  63,  64,  66,  67,
         68,  69,  70,  71,  73,  78,  79,  80,  81,  82,  83,  85,  88,
         89,  90,  91,  92,  94,  95,  96,  97,  99, 101, 113, 114, 119,
            121, 126, 127, 134, 138, 142, 148, 149],
                          dtype=int64),)
```

In [20]:
```
sorted_rscore= sorted(iris['Sepal_Length'])
```

In [21]:
```
sorted_rscore
```

Out[21]:

```
[4.3,
 4.4,
 4.4,
 4.4,
 4.5,
 4.6,
 4.6,
 4.6,
 4.6,
 4.7,
 4.7,
 4.8,
 4.8,
 4.8,
 4.8,
 4.8,
 4.9,
 4.9,
 4.9,
 4.9,
 4.9,
 4.9,
 5.5,
 5.5,
 5.6,
 5.6,
 5.6,
 5.6,
 5.6,
```

In [22]:

```
q1 = np.percentile(sorted_rscore, 25)
q3 = np.percentile(sorted_rscore, 75)
print(q1,q3)
```

```
5.1 6.4
```

In [23]:

```
IQR = q3-q1
```

In [24]:

```
IQR
```

Out[24]:

```
1.3000000000000007
```

In [25]:

```
lwr_bound = q1-
(1.5*IQR) upr_bound =
q3+(1.5*IQR)
```

```
3.1499999999999986  8.350000000000001
```

In [26]:

```
r_outliers = []
for i in sorted_rscore:
        if (i<lwr_bound or
                i>upr_bound):
                r_outliers.append(i)
```

In [27]:

```
print(r_outliers)
```

```
[]
```

In [28]:

```
z = np.abs(stats.zscore(iris['Sepal_Width']))
```

In [29]:

```
print(z)
```

```
0      1.032057
1      0.124958
2      0.337848
3      0.106445
4      1.263460
         ...   
145    0.124958
146    1.281972
147    0.124958
148    0.800654
149    0.124958
Name: Sepal_Width, Length: 150, dtype:
      float64
```

In [30]:
```
threshold = 0.5
```

In [31]:
```
sample_outliers = np.where(z <threshold)
sample_outliers
```

Out[31]:
```
(array([  1,   2,   3,   8,   9,  12,  13,  25,  29,  30,  34,  35,  37,
         38,  42,  45,  47,  50,  51,  52,  58,  61,  63,  64,  65,  66,
         70,  74,  75,  77,  78,  84,  86,  88,  91,  95,  96,  97, 102,
        103, 104, 105, 107, 110, 112, 115, 116, 120, 125, 127, 129, 135,
               137, 138, 139, 140, 141, 143, 145, 147, 149],
                              dtype=int64),)
```

In [32]:
```
sorted_rscore=  sorted(iris['Sepal_Width'])
```

In [33]:
```
sorted_rscore
```

Out[33]:
```
[2.0,
 2.2,
 2.2,
 2.2,
 2.3,
 2.3,
 2.3,
 2.3,
 2.4,
 2.4,
 2.4,
 2.5,
 2.5,
 2.5,
 2.5,
 2.5,
 2.5,
 2.5,
 2.5,
 2.6,
 2.6,
 2.6,
 2.6,
 2.6,
 2.7,
 2.7,
 2.7,
 2.7,
 2.7,
 2.7,
 2.7,
 2.7,
 2.7,
 2.8,
 2.8,
```

In [34]:
```
q1  =  np.percentile(sorted_rscore,  25)
q3  =  np.percentile(sorted_rscore,  75)
print(q1,q3)
```

```
2.8 3.3
```

In [35]:
```
IQR  =  q3-q1
```

In [36]:
```
IQR
```

Out[36]:
```
0.5
```

In [37]:
```
lwr_bound  =  q1-
(1.5*IQR) upr_bound  =
q3+(1.5*IQR)
```

```
2.05 4.05
```

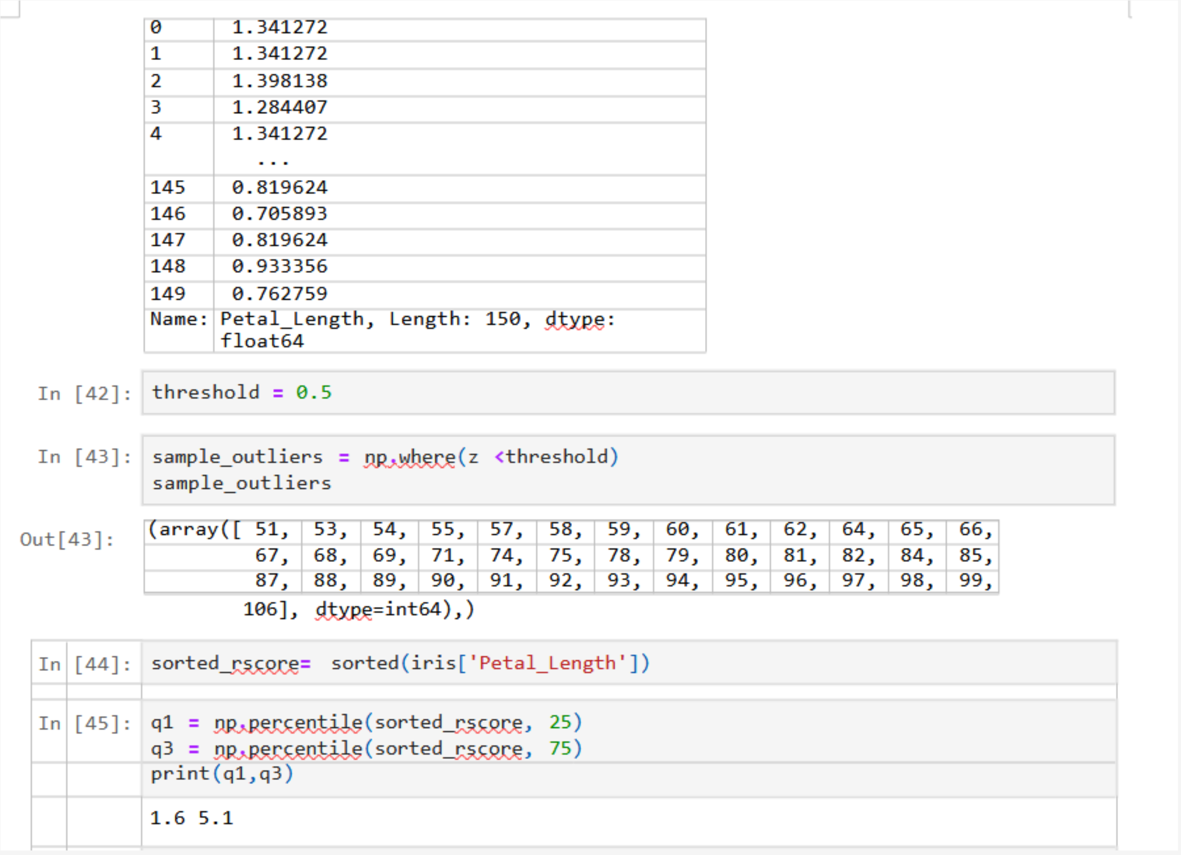
In [38]:
```
r_outliers  =  []
for  i  in  sorted_rscore:
        if  (i<lwr_bound  or
                i>upr_bound):
                r_outliers.append(i)
print(r_outliers)
```

```
[2.0, 4.1, 4.2, 4.4]
```

In [39]:
```
from scipy import stats
```

In [40]:
```
z  =  np.abs(stats.zscore(iris['Petal_Length']))
```

In [41]:
```
print(z)
```



```
0       1.341272
1       1.341272
2       1.398138
3       1.284407
4       1.341272
          ...
145     0.819624
146     0.705893
147     0.819624
148     0.933356
149     0.762759
Name: Petal_Length, Length: 150, dtype:
float64
```

In [42]:
```
threshold  =  0.5
```

In [43]:
```
sample_outliers  =  np.where(z  <threshold)
sample_outliers
```

Out[43]:
```
(array([ 51,  53,  54,  55,  57,  58,  59,  60,  61,  62,  64,  65,  66,
         67,  68,  69,  71,  74,  75,  78,  79,  80,  81,  82,  84,  85,
         87,  88,  89,  90,  91,  92,  93,  94,  95,  96,  97,  98,  99,
        106],  dtype=int64),)
```

In [44]:
```
sorted_rscore=  sorted(iris['Petal_Length'])
```

In [45]:
```
q1  =  np.percentile(sorted_rscore,  25)
q3  =  np.percentile(sorted_rscore,  75)
print(q1,q3)
```

```
1.6 5.1
```

```
In [46]: IQR = q3-q1
```

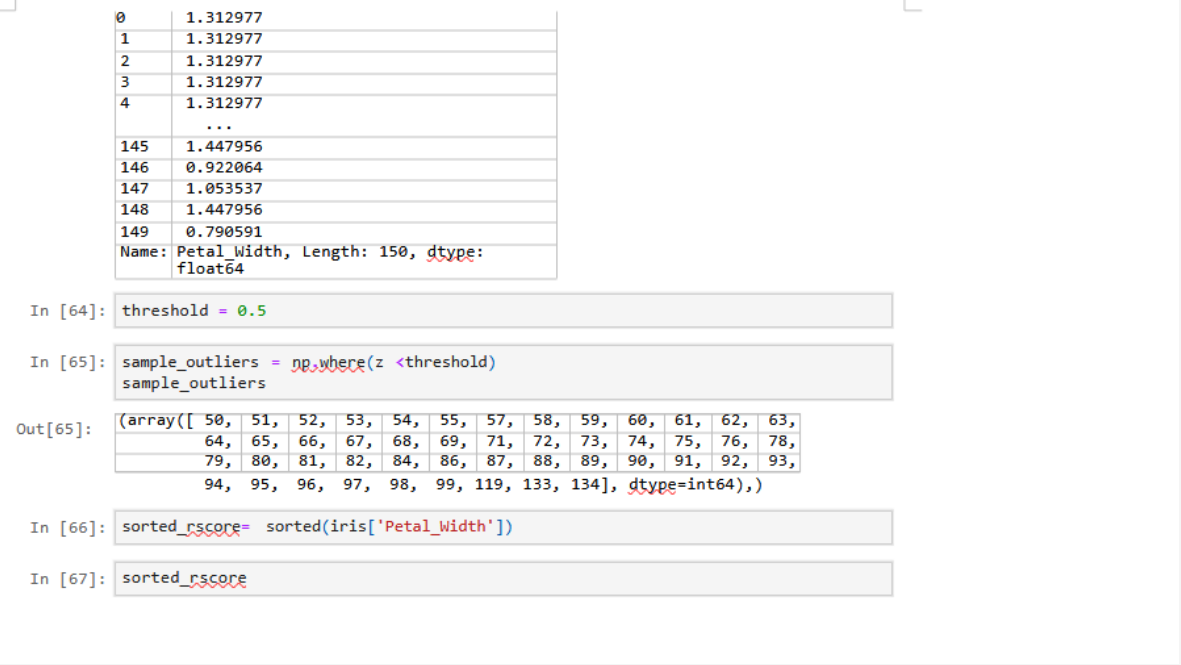
```
In [47]: lwr_bound = q1-(1.5*IQR)
         upr_bound = q3+(1.5*IQR)
         print(lwr_bound,  upr_bound)

         -3.6499999999999999  10.349999999999998
```

```
In [60]: r_outliers = []
         for i in sorted_rscore:
                 if (i<lwr_bound or i>upr_bound):
                         r_outliers.append(i)
         print(r_outliers)

         []
```

```
In [61]: print(r_outliers)

         []
```

```
In [62]: z  =  np.abs(stats.zscore(iris['Petal_Width']))
```

```
In [63]: print(z)
```



```
0      1.312977
1      1.312977
2      1.312977
3      1.312977
4      1.312977
         ...
145    1.447956
146    0.922064
147    1.053537
148    1.447956
149    0.790591
Name: Petal_Width, Length: 150, dtype:
       float64
```

```
In [64]: threshold = 0.5
```

```
In [65]: sample_outliers  =  np.where(z <threshold)
         sample_outliers

Out[65]: (array([ 50,  51,  52,  53,  54,  55,  57,  58,  59,  60,  61,  62,  63,
                  64,  65,  66,  67,  68,  69,  71,  72,  73,  74,  75,  76,  78,
                  79,  80,  81,  82,  84,  86,  87,  88,  89,  90,  91,  92,  93,
                  94,  95,  96,  97,  98,  99, 119, 133, 134], dtype=int64),)
```

```
In [66]: sorted_rscore=  sorted(iris['Petal_Width'])
```

```
In [67]: sorted_rscore
```

Out[67]:

```
[0.1,
 0.1,
 0.1,
 0.1,
 0.1,
 0.1,
 0.2,
 0.2,
 1.1,
 1.2,
 1.2,
 1.2,
 1.2,
 1.8,
 1.8,
 1.8,
 1.8,
 1.8,
 1.8,
 1.9,
 1.9,
 1.9,
 2.0,
 2.0,
 2.0,
 2.0,
 2.0,
 2.0,
 2.1,
 2.3,
 2.3,
 2.3,
 2.3,
 2.3,
 2.3,
 2.3,
 2.4,
 2.4,
 2.4,
 2.5,
 2.5,
 2.5]
```

In [68]:

```
q1  =  np.percentile(sorted_rscore,  25)
q3  =  np.percentile(sorted_rscore,  75)
print(q1,q3)
```

```
0.3 1.8
```

In [69]:

```
IQR  =  q3-q1
```

In [70]:

```
lwr_bound  =  q1-
(1.5*IQR)  upr_bound  =
q3+(1.5*IQR)
print(lwr_bound,  upr_bound)
```

```
-1.95 4.05
```

In [71]:

```
r_outliers  =  []
for  i  in  sorted_rscore:
        if  (i<lwr_bound  or
                i>upr_bound):
                r_outliers.append(i)
print(r_outliers)
```

```
[]
```