In [1]:
```
import pandas as pd
import numpy as np
import seaborn as sns
import warnings
warnings.filterwarnings(action='ignore')
```

In [3]:
```
df=pd.read_csv(r"C:\Users\Shree\Downloads\iris.csv")
df
```

Out[3]:

	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

In [7]:
```
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
```

In [9]:
```
df.head()
```

Out[9]:

	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

In [11]:
```
df.shape
```

Out[11]:
```
(150, 5)
```

In [13]:
```
df.describe()
```

Out[13]:

	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 [17]:
```
df.groupby('species').count()
```

Out[17]:

species	sepal_length	sepal_width	petal_length	petal_width
setosa	50	50	50	50
versicolor	50	50	50	50
virginica	50	50	50	50

In [19]:
```
setosa_data=df[df['species']=='setosa']
setosa_data
```

Out[19]:

	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
5	5.4	3.9	1.7	0.4	setosa
6	4.6	3.4	1.4	0.3	setosa
7	5.0	3.4	1.5	0.2	setosa
8	4.4	2.9	1.4	0.2	setosa
9	4.9	3.1	1.5	0.1	setosa
10	5.4	3.7	1.5	0.2	setosa
11	4.8	3.4	1.6	0.2	setosa
12	4.8	3.0	1.4	0.1	setosa
13	4.3	3.0	1.1	0.1	setosa
14	5.8	4.0	1.2	0.2	setosa
15	5.7	4.4	1.5	0.4	setosa
16	5.4	3.9	1.3	0.4	setosa
17	5.1	3.5	1.4	0.3	setosa
18	5.7	3.8	1.7	0.3	setosa
19	5.1	3.8	1.5	0.3	setosa
20	5.4	3.4	1.7	0.2	setosa
21	5.1	3.7	1.5	0.4	setosa
22	4.6	3.6	1.0	0.2	setosa
23	5.1	3.3	1.7	0.5	setosa
24	4.8	3.4	1.9	0.2	setosa
25	5.0	3.0	1.6	0.2	setosa
26	5.0	3.4	1.6	0.4	setosa
27	5.2	3.5	1.5	0.2	setosa
28	5.2	3.4	1.4	0.2	setosa
29	4.7	3.2	1.6	0.2	setosa
30	4.8	3.1	1.6	0.2	setosa
31	5.4	3.4	1.5	0.4	setosa
32	5.2	4.1	1.5	0.1	setosa

	sepal_length	sepal_width	petal_length	petal_width	species
33	5.5	4.2	1.4	0.2	setosa
34	4.9	3.1	1.5	0.1	setosa
35	5.0	3.2	1.2	0.2	setosa
36	5.5	3.5	1.3	0.2	setosa
37	4.9	3.1	1.5	0.1	setosa
38	4.4	3.0	1.3	0.2	setosa
39	5.1	3.4	1.5	0.2	setosa
40	5.0	3.5	1.3	0.3	setosa
41	4.5	2.3	1.3	0.3	setosa
42	4.4	3.2	1.3	0.2	setosa
43	5.0	3.5	1.6	0.6	setosa
44	5.1	3.8	1.9	0.4	setosa
45	4.8	3.0	1.4	0.3	setosa
46	5.1	3.8	1.6	0.2	setosa
47	4.6	3.2	1.4	0.2	setosa
48	5.3	3.7	1.5	0.2	setosa
49	5.0	3.3	1.4	0.2	setosa

In [27]:
```
virginica_data=df[df['species']=='virginica']
virginica_data
```

Out[27]:

	sepal_length	sepal_width	petal_length	petal_width	species
100	6.3	3.3	6.0	2.5	virginica
101	5.8	2.7	5.1	1.9	virginica
102	7.1	3.0	5.9	2.1	virginica
103	6.3	2.9	5.6	1.8	virginica
104	6.5	3.0	5.8	2.2	virginica
105	7.6	3.0	6.6	2.1	virginica
106	4.9	2.5	4.5	1.7	virginica
107	7.3	2.9	6.3	1.8	virginica
108	6.7	2.5	5.8	1.8	virginica
109	7.2	3.6	6.1	2.5	virginica
110	6.5	3.2	5.1	2.0	virginica
111	6.4	2.7	5.3	1.9	virginica
112	6.8	3.0	5.5	2.1	virginica
113	5.7	2.5	5.0	2.0	virginica
114	5.8	2.8	5.1	2.4	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
118	7.7	2.6	6.9	2.3	virginica
119	6.0	2.2	5.0	1.5	virginica
120	6.9	3.2	5.7	2.3	virginica
121	5.6	2.8	4.9	2.0	virginica
122	7.7	2.8	6.7	2.0	virginica
123	6.3	2.7	4.9	1.8	virginica
124	6.7	3.3	5.7	2.1	virginica
125	7.2	3.2	6.0	1.8	virginica
126	6.2	2.8	4.8	1.8	virginica
127	6.1	3.0	4.9	1.8	virginica
128	6.4	2.8	5.6	2.1	virginica
129	7.2	3.0	5.8	1.6	virginica
130	7.4	2.8	6.1	1.9	virginica
131	7.9	3.8	6.4	2.0	virginica
132	6.4	2.8	5.6	2.2	virginica

	sepal_length	sepal_width	petal_length	petal_width	species
133	6.3	2.8	5.1	1.5	virginica
134	6.1	2.6	5.6	1.4	virginica
135	7.7	3.0	6.1	2.3	virginica
136	6.3	3.4	5.6	2.4	virginica
137	6.4	3.1	5.5	1.8	virginica
138	6.0	3.0	4.8	1.8	virginica
139	6.9	3.1	5.4	2.1	virginica
140	6.7	3.1	5.6	2.4	virginica
141	6.9	3.1	5.1	2.3	virginica
142	5.8	2.7	5.1	1.9	virginica
143	6.8	3.2	5.9	2.3	virginica
144	6.7	3.3	5.7	2.5	virginica
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

In [31]:
```
versicolor_data=df[df['species']=='versicolor']
versicolor_data
```

Out[31]:

	sepal_length	sepal_width	petal_length	petal_width	species
50	7.0	3.2	4.7	1.4	versicolor
51	6.4	3.2	4.5	1.5	versicolor
52	6.9	3.1	4.9	1.5	versicolor
53	5.5	2.3	4.0	1.3	versicolor
54	6.5	2.8	4.6	1.5	versicolor
55	5.7	2.8	4.5	1.3	versicolor
56	6.3	3.3	4.7	1.6	versicolor
57	4.9	2.4	3.3	1.0	versicolor
58	6.6	2.9	4.6	1.3	versicolor
59	5.2	2.7	3.9	1.4	versicolor
60	5.0	2.0	3.5	1.0	versicolor
61	5.9	3.0	4.2	1.5	versicolor
62	6.0	2.2	4.0	1.0	versicolor
63	6.1	2.9	4.7	1.4	versicolor
64	5.6	2.9	3.6	1.3	versicolor
65	6.7	3.1	4.4	1.4	versicolor
66	5.6	3.0	4.5	1.5	versicolor
67	5.8	2.7	4.1	1.0	versicolor
68	6.2	2.2	4.5	1.5	versicolor
69	5.6	2.5	3.9	1.1	versicolor
70	5.9	3.2	4.8	1.8	versicolor
71	6.1	2.8	4.0	1.3	versicolor
72	6.3	2.5	4.9	1.5	versicolor
73	6.1	2.8	4.7	1.2	versicolor
74	6.4	2.9	4.3	1.3	versicolor
75	6.6	3.0	4.4	1.4	versicolor
76	6.8	2.8	4.8	1.4	versicolor
77	6.7	3.0	5.0	1.7	versicolor
78	6.0	2.9	4.5	1.5	versicolor
79	5.7	2.6	3.5	1.0	versicolor
80	5.5	2.4	3.8	1.1	versicolor
81	5.5	2.4	3.7	1.0	versicolor
82	5.8	2.7	3.9	1.2	versicolor

	sepal_length	sepal_width	petal_length	petal_width	species
83	6.0	2.7	5.1	1.6	versicolor
84	5.4	3.0	4.5	1.5	versicolor
85	6.0	3.4	4.5	1.6	versicolor
86	6.7	3.1	4.7	1.5	versicolor
87	6.3	2.3	4.4	1.3	versicolor
88	5.6	3.0	4.1	1.3	versicolor
89	5.5	2.5	4.0	1.3	versicolor
90	5.5	2.6	4.4	1.2	versicolor
91	6.1	3.0	4.6	1.4	versicolor
92	5.8	2.6	4.0	1.2	versicolor
93	5.0	2.3	3.3	1.0	versicolor
94	5.6	2.7	4.2	1.3	versicolor
95	5.7	3.0	4.2	1.2	versicolor
96	5.7	2.9	4.2	1.3	versicolor
97	6.2	2.9	4.3	1.3	versicolor
98	5.1	2.5	3.0	1.1	versicolor
99	5.7	2.8	4.1	1.3	versicolor

In [33]:
```
setosa_data.describe()
```

Out[33]:

	sepal_length	sepal_width	petal_length	petal_width
count	50.00000	50.000000	50.000000	50.00000
mean	5.00600	3.418000	1.464000	0.24400
std	0.35249	0.381024	0.173511	0.10721
min	4.30000	2.300000	1.000000	0.10000
25%	4.80000	3.125000	1.400000	0.20000
50%	5.00000	3.400000	1.500000	0.20000
75%	5.20000	3.675000	1.575000	0.30000
max	5.80000	4.400000	1.900000	0.60000

In [35]:
```
virginica_data.describe()
```

Out[35]:

	sepal_length	sepal_width	petal_length	petal_width
count	50.00000	50.000000	50.000000	50.00000
mean	6.58800	2.974000	5.552000	2.02600
std	0.63588	0.322497	0.551895	0.27465
min	4.90000	2.200000	4.500000	1.40000
25%	6.22500	2.800000	5.100000	1.80000
50%	6.50000	3.000000	5.550000	2.00000
75%	6.90000	3.175000	5.875000	2.30000
max	7.90000	3.800000	6.900000	2.50000

In [37]:
```
versicolor_data.describe()
```

Out[37]:

	sepal_length	sepal_width	petal_length	petal_width
count	50.000000	50.000000	50.000000	50.000000
mean	5.936000	2.770000	4.260000	1.326000
std	0.516171	0.313798	0.469911	0.197753
min	4.900000	2.000000	3.000000	1.000000
25%	5.600000	2.525000	4.000000	1.200000
50%	5.900000	2.800000	4.350000	1.300000
75%	6.300000	3.000000	4.600000	1.500000
max	7.000000	3.400000	5.100000	1.800000

In [41]:
```
setosa_data.min()
```

Out[41]:
```
sepal_length       4.3
sepal_width        2.3
petal_length       1.0
petal_width        0.1
species         setosa
dtype: object
```

In [43]:
```
setosa_data.max()
```

Out[43]:
```
sepal_length       5.8
sepal_width        4.4
petal_length       1.9
petal_width        0.6
species         setosa
dtype: object
```

In [49]:
```
setosa_data.sepal_length.mean()
```

Out[49]:
```
5.006
```

In [53]:
```
setosa_data.sepal_length.min()
```

Out[53]: 4.3

In [55]:
```
setosa_data.sepal_length.std()
```

Out[55]: 0.3524896872134512

In [61]:
```
setosa_data.sepal_length.quantile(0.25)
```

Out[61]: 4.8

In [65]:
```
setosa_data.sepal_length.quantile(0.75)
```

Out[65]: 5.2

In [67]:
```
def display_statistics(species_data,species_name):
  nc=['sepal_length',   'sepal_width',  'petal_length', 'petal_width']
  print(f"Statistics for {species_name}:")
  print("mean\n",species_data[nc].mean())
  print("std\n",species_data[nc].std())
  print("median\n",species_data[nc].median())
  print("25%\n",species_data[nc].quantile(0.25))
  print("75%\n",species_data[nc].quantile(0.75))

display_statistics(setosa_data,'setosa')
display_statistics(virginica_data,'virginica')
display_statistics(versicolor_data,'versicolor')
```

```
Statistics for setosa:
mean
 sepal_length    5.006
sepal_width     3.418
petal_length    1.464
petal_width     0.244
dtype: float64
std
 sepal_length    0.352490
sepal_width     0.381024
petal_length    0.173511
petal_width     0.107210
dtype: float64
median
 sepal_length    5.0
sepal_width     3.4
petal_length    1.5
petal_width     0.2
dtype: float64
25%
 sepal_length    4.800
sepal_width     3.125
petal_length    1.400
petal_width     0.200
Name: 0.25, dtype: float64
75%
 sepal_length    5.200
sepal_width     3.675
petal_length    1.575
petal_width     0.300
Name: 0.75, dtype: float64
Statistics for virginica:
mean
 sepal_length    6.588
sepal_width     2.974
petal_length    5.552
petal_width     2.026
dtype: float64
std
 sepal_length    0.635880
sepal_width     0.322497
petal_length    0.551895
petal_width     0.274650
dtype: float64
median
 sepal_length    6.50
sepal_width     3.00
petal_length    5.55
petal_width     2.00
dtype: float64
25%
 sepal_length    6.225
sepal_width     2.800
petal_length    5.100
petal_width     1.800
Name: 0.25, dtype: float64
75%
 sepal_length    6.900
sepal_width     3.175
petal_length    5.875
```

```
petal_width     2.300
Name: 0.75, dtype: float64
Statistics for versicolor:
mean
 sepal_length    5.936
sepal_width     2.770
petal_length    4.260
petal_width     1.326
dtype: float64
std
 sepal_length    0.516171
sepal_width     0.313798
petal_length    0.469911
petal_width     0.197753
dtype: float64
median
 sepal_length    5.90
sepal_width     2.80
petal_length    4.35
petal_width     1.30
dtype: float64
25%
 sepal_length    5.600
sepal_width     2.525
petal_length    4.000
petal_width     1.200
Name: 0.25, dtype: float64
75%
 sepal_length    6.3
sepal_width     3.0
petal_length    4.6
petal_width     1.5
Name: 0.75, dtype: float64
```

In [69]:

```python
import numpy as np

def display_statistics(species_data, species_name):
    nc = ['sepal_length', 'sepal_width', 'petal_length', 'petal_width']
    print(f"\nStatistics for {species_name}:")

    print("\nmean")
    for col in nc:
        column_data = species_data[col].values
        mean = sum(column_data) / len(column_data)
        print(f"{col}    {mean:.3f}")

    print("\nStd")
    for col in nc:
        column_data = species_data[col].values
        mean = sum(column_data) / len(column_data)
        variance = sum((x - mean) ** 2 for x in column_data) / len(column_data)
        std_deviation = np.sqrt(variance)
        print(f"{col}    {std_deviation:.6f}")

    print("\nQuantile 25")
    for col in nc:
        column_data =sorted(species_data[col].values)
        q1=np.percentile(column_data,0.25)
        print(f"25th Percentile of {col}: {q1}")
    print("\nQuantile 75")
```

```
    for col in nc:
        column_data =sorted(species_data[col].values)
        q3=np.percentile(column_data,0.75)
        print(f"75th Percentile of {col}: {q3}")

display_statistics(setosa_data,'setosa')
display_statistics(virginica_data,'virginica')
display_statistics(versicolor_data,'versicolor')
```

```
Statistics for setosa:

mean
sepal_length    5.006
sepal_width    3.418
petal_length    1.464
petal_width    0.244

Std
sepal_length    0.348947
sepal_width    0.377195
petal_length    0.171767
petal_width    0.106132

Quantile 25
25th Percentile of sepal_length: 4.31225
25th Percentile of sepal_width: 2.3735
25th Percentile of petal_length: 1.01225
25th Percentile of petal_width: 0.1

Quantile 75
75th Percentile of sepal_length: 4.33675
75th Percentile of sepal_width: 2.5204999999999997
75th Percentile of petal_length: 1.03675
75th Percentile of petal_width: 0.1

Statistics for virginica:

mean
sepal_length    6.588
sepal_width    2.974
petal_length    5.552
petal_width    2.026

Std
sepal_length    0.629489
sepal_width    0.319255
petal_length    0.546348
petal_width    0.271890

Quantile 25
25th Percentile of sepal_length: 4.98575
25th Percentile of sepal_width: 2.2367500000000002
25th Percentile of petal_length: 4.53675
25th Percentile of petal_width: 1.41225

Quantile 75
75th Percentile of sepal_length: 5.15725
75th Percentile of sepal_width: 2.31025
75th Percentile of petal_length: 4.61025
75th Percentile of petal_width: 1.43675

Statistics for versicolor:

mean
sepal_length    5.936
sepal_width    2.770
petal_length    4.260
petal_width    1.326
```

```
Std
sepal_length    0.510983
sepal_width    0.310644
petal_length    0.465188
petal_width    0.195765

Quantile 25
25th Percentile of sepal_length: 4.91225
25th Percentile of sepal_width: 2.0245
25th Percentile of petal_length: 3.03675
25th Percentile of petal_width: 1.0

Quantile 75
75th Percentile of sepal_length: 4.93675
75th Percentile of sepal_width: 2.0735
75th Percentile of petal_length: 3.1102499999999997
75th Percentile of petal_width: 1.0
```

In [ ]: