Iris Flowers Classification ML Project :

Begineer Task -1 The iris flowers dataset contains numeric attributes, and it is perfect for beginners to learn about supervised ML algorithms, mainly how to load and handle data. Also, since this is a small dataset, it can easily fit in memory without requiring special transformations or scaling capabilities.

Datasetlink : http://archive.ics.uci.edu/ml/datasets/Iris

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Required Libraries:

```
import numpy as np
import pandas as pd
import matplotlib as plt
from sklearn.model_selection import train_test_split
from sklearn import tree
from sklearn.cluster import KMeans
from sklearn import metrics
```

Reading Dataset:

```
header=["sepal length","sepal width","petal length","petal
width","class"]
data=pd.read_csv("http://archive.ics.uci.edu/ml/machine-learning-
databases/iris/iris.data",header= None,names = header)
print(data)
```

```
     sepal length  sepal width  petal length  petal width
class
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 x 5 columns]
```

Exploring Dataset :

```
data.index
```

```
RangeIndex(start=0, stop=150, step=1)
```

```
data.columns
```

```
Index(['sepal length', 'sepal width', 'petal length', 'petal width',
'class'], dtype='object')
```

```
data.size
```

```
750
```

```
data.shape
```

```
(150, 5)
```

```
data.head(10)
```

```
   sepal length  sepal width  petal length  petal width        class
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
5           5.4          3.9           1.7          0.4  Iris-setosa
6           4.6          3.4           1.4          0.3  Iris-setosa
7           5.0          3.4           1.5          0.2  Iris-setosa
8           4.4          2.9           1.4          0.2  Iris-setosa
9           4.9          3.1           1.5          0.1  Iris-setosa
```

```
data.tail(10)
```

```
     sepal length  sepal width  petal length  petal width
class
140           6.7          3.1           5.6          2.4  Iris-
virginica
141           6.9          3.1           5.1          2.3  Iris-
virginica
142           5.8          2.7           5.1          1.9  Iris-
virginica
143           6.8          3.2           5.9          2.3  Iris-
virginica
144           6.7          3.3           5.7          2.5  Iris-
virginica
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
```

```
data.info
```

```
<bound method DataFrame.info of      sepal length  sepal width  petal
length  petal width           class
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 x 5 columns]>
```

```
data.describe()
```

```
       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
```

Checking the Null values :

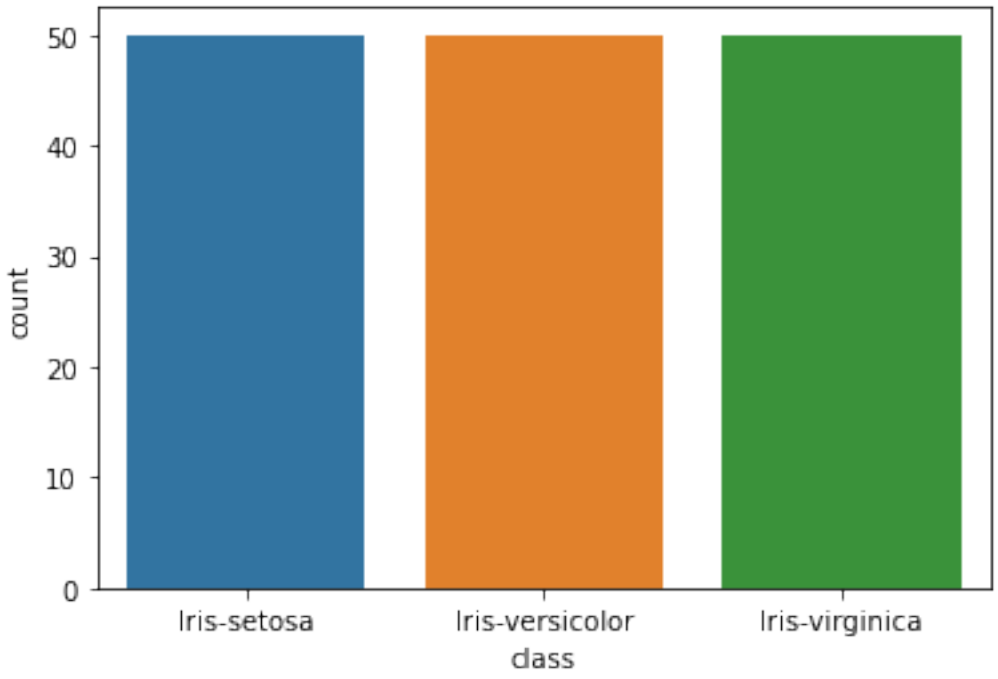
```
data.isnull().sum()
```

```
sepal length    0
sepal width     0
petal length    0
petal width     0
class           0
dtype: int64
```

Visualization of dataset :

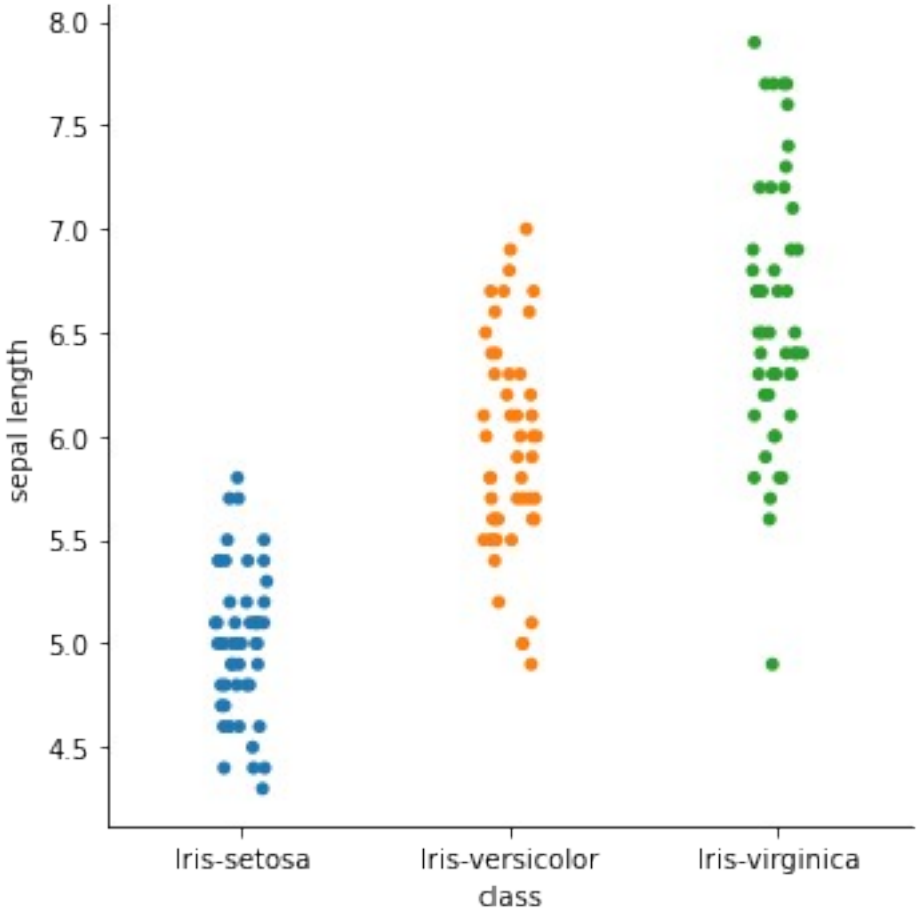
```
import matplotlib.pyplot as plt
import seaborn as sns
sns.countplot(data['class'],label="Size")
plt.show()
```

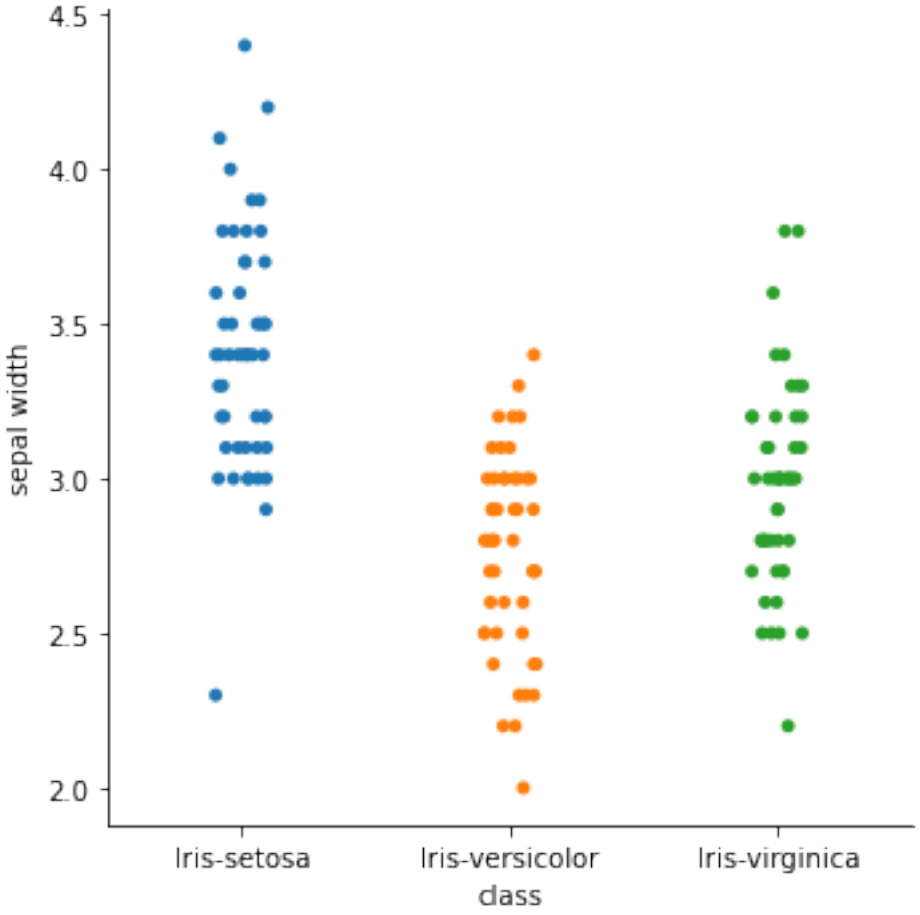
```
C:\Users\Sharayu\OneDrive\jupyter\lib\site-packages\seaborn\
_decorators.py:36: FutureWarning: Pass the following variable as a
keyword arg: x. From version 0.12, the only valid positional argument
will be `data`, and passing other arguments without an explicit
keyword will result in an error or misinterpretation.
  warnings.warn(
```

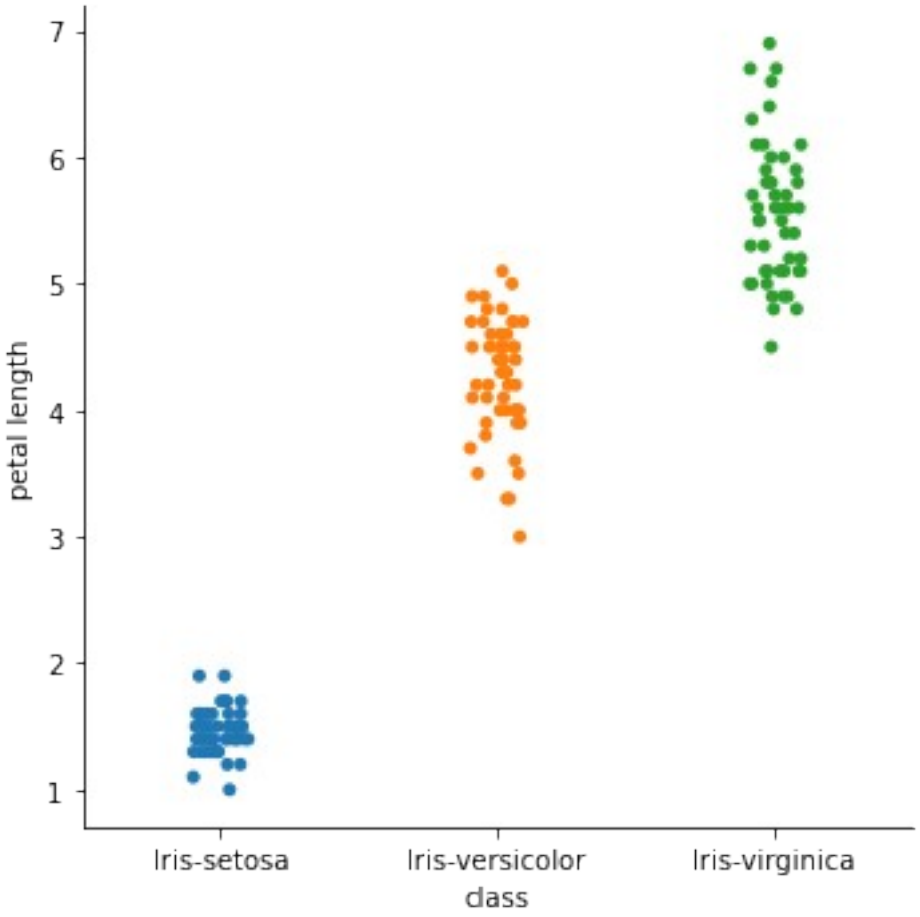


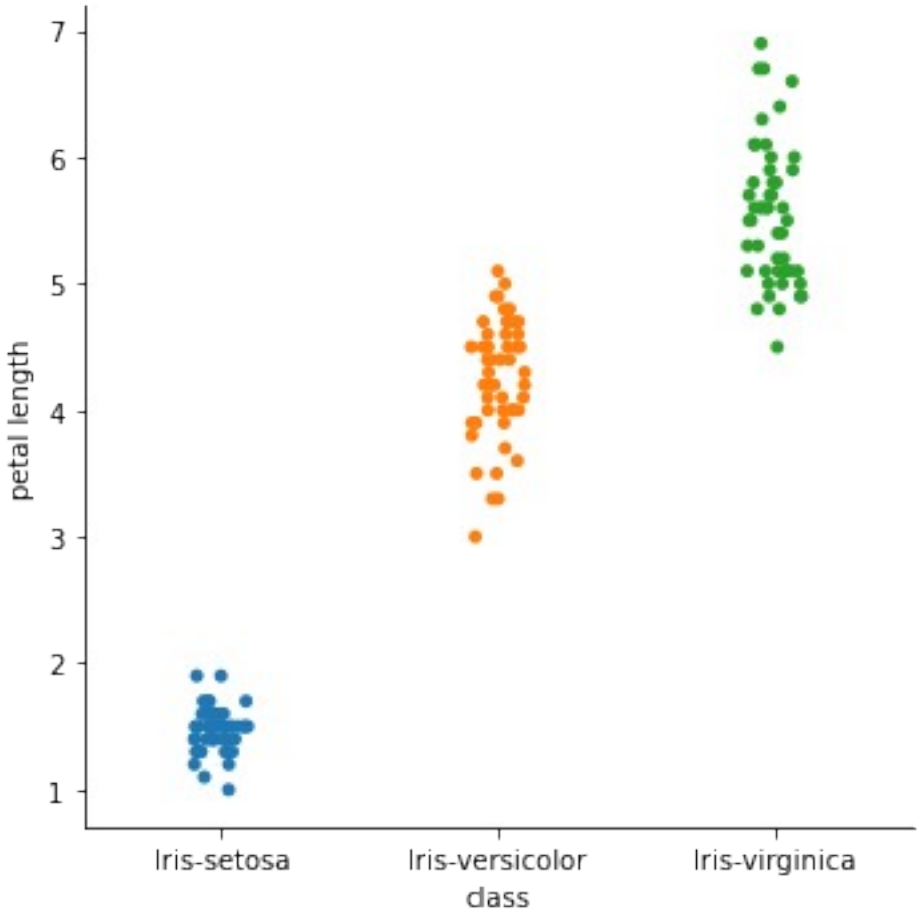

```
sns.catplot(x='class',y='sepal length',data=data)
sns.catplot(x='class',y='sepal width',data=data)
sns.catplot(x='class',y='petal length',data=data)
sns.catplot(x='class',y='petal length',data=data)
```

```
<seaborn.axisgrid.FacetGrid at 0x21d4b081850>
```




4.5
4.0
3.5
3.0
2.5
2.0
sepal width
Iris-setosa
Iris-versicolor
Iris-virginica
class


7
6
5
4
3
2
1
petal length
Iris-setosa
Iris-versicolor
Iris-virginica
class



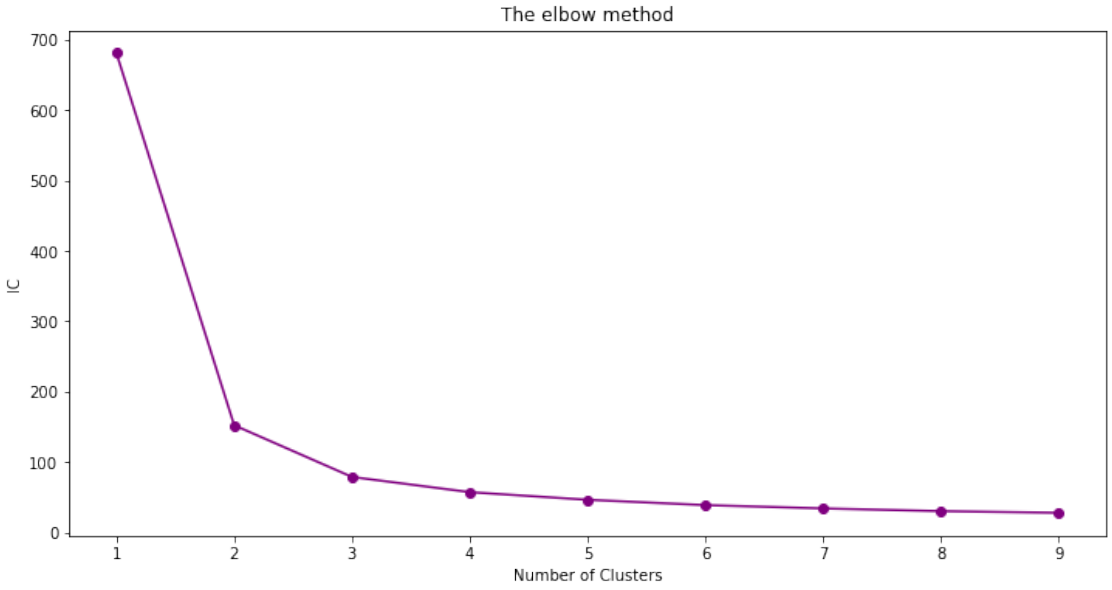
Knowing the Number of optimum Cluster :

```
from sklearn.cluster import KMeans
ic=[]
for i in range(1,10):
    kmeans =KMeans(n_jobs=-1,n_clusters = i,init = 'k-means++')
    kmeans.fit(data.iloc[:,[0,1,2,3]])
    ic.append(kmeans.inertia_)
```

```
C:\Users\Sharayu\OneDrive\jupyter\lib\site-packages\sklearn\cluster\
_kmeans.py:792: FutureWarning: 'n_jobs' was deprecated in version 0.23
and will be removed in 1.0 (renaming of 0.25).
  warnings.warn("'n_jobs' was deprecated in version 0.23 and will be"
C:\Users\Sharayu\OneDrive\jupyter\lib\site-packages\sklearn\cluster\
_kmeans.py:881: UserWarning: KMeans is known to have a memory leak on
Windows with MKL, when there are less chunks than available threads.
You can avoid it by setting the environment variable
OMP_NUM_THREADS=1.
  warnings.warn(
C:\Users\Sharayu\OneDrive\jupyter\lib\site-packages\sklearn\cluster\
_kmeans.py:792: FutureWarning: 'n_jobs' was deprecated in version 0.23
and will be removed in 1.0 (renaming of 0.25).
```

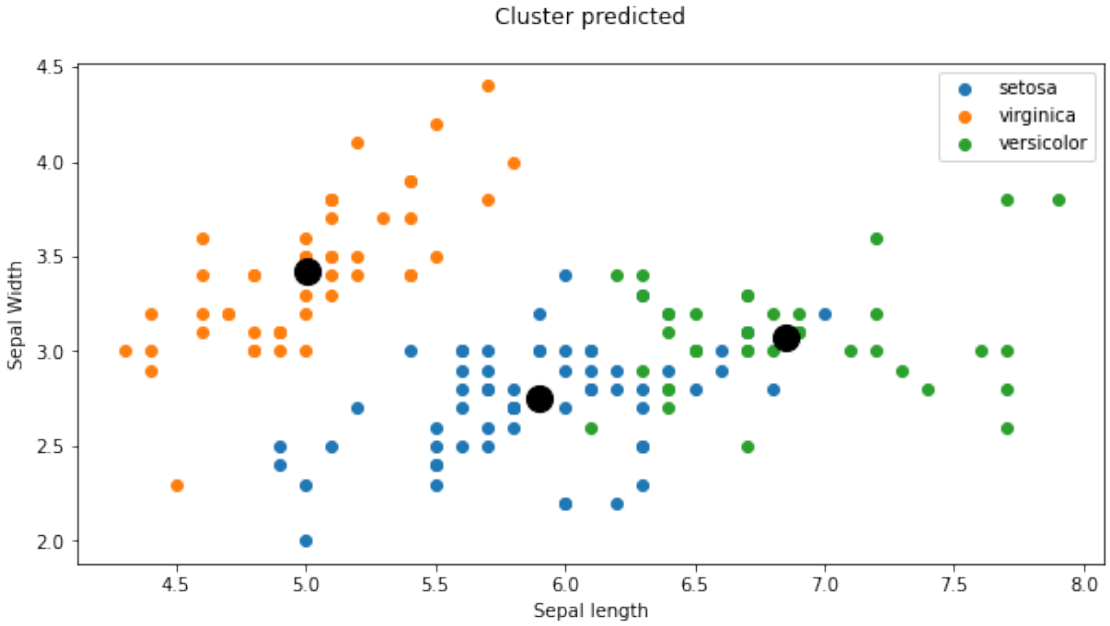
```
  warnings.warn("'n_jobs' was deprecated in version 0.23 and will be"
C:\Users\Sharayu\OneDrive\jupyter\lib\site-packages\sklearn\cluster\
_kmeans.py:792: FutureWarning: 'n_jobs' was deprecated in version 0.23
and will be removed in 1.0 (renaming of 0.25).
  warnings.warn("'n_jobs' was deprecated in version 0.23 and will be"
C:\Users\Sharayu\OneDrive\jupyter\lib\site-packages\sklearn\cluster\
_kmeans.py:792: FutureWarning: 'n_jobs' was deprecated in version 0.23
and will be removed in 1.0 (renaming of 0.25).
  warnings.warn("'n_jobs' was deprecated in version 0.23 and will be"
C:\Users\Sharayu\OneDrive\jupyter\lib\site-packages\sklearn\cluster\
_kmeans.py:792: FutureWarning: 'n_jobs' was deprecated in version 0.23
and will be removed in 1.0 (renaming of 0.25).
  warnings.warn("'n_jobs' was deprecated in version 0.23 and will be"
C:\Users\Sharayu\OneDrive\jupyter\lib\site-packages\sklearn\cluster\
_kmeans.py:792: FutureWarning: 'n_jobs' was deprecated in version 0.23
and will be removed in 1.0 (renaming of 0.25).
  warnings.warn("'n_jobs' was deprecated in version 0.23 and will be"
C:\Users\Sharayu\OneDrive\jupyter\lib\site-packages\sklearn\cluster\
_kmeans.py:792: FutureWarning: 'n_jobs' was deprecated in version 0.23
and will be removed in 1.0 (renaming of 0.25).
  warnings.warn("'n_jobs' was deprecated in version 0.23 and will be"
C:\Users\Sharayu\OneDrive\jupyter\lib\site-packages\sklearn\cluster\
_kmeans.py:792: FutureWarning: 'n_jobs' was deprecated in version 0.23
and will be removed in 1.0 (renaming of 0.25).
  warnings.warn("'n_jobs' was deprecated in version 0.23 and will be"
C:\Users\Sharayu\OneDrive\jupyter\lib\site-packages\sklearn\cluster\
_kmeans.py:792: FutureWarning: 'n_jobs' was deprecated in version 0.23
and will be removed in 1.0 (renaming of 0.25).
  warnings.warn("'n_jobs' was deprecated in version 0.23 and will be"
```

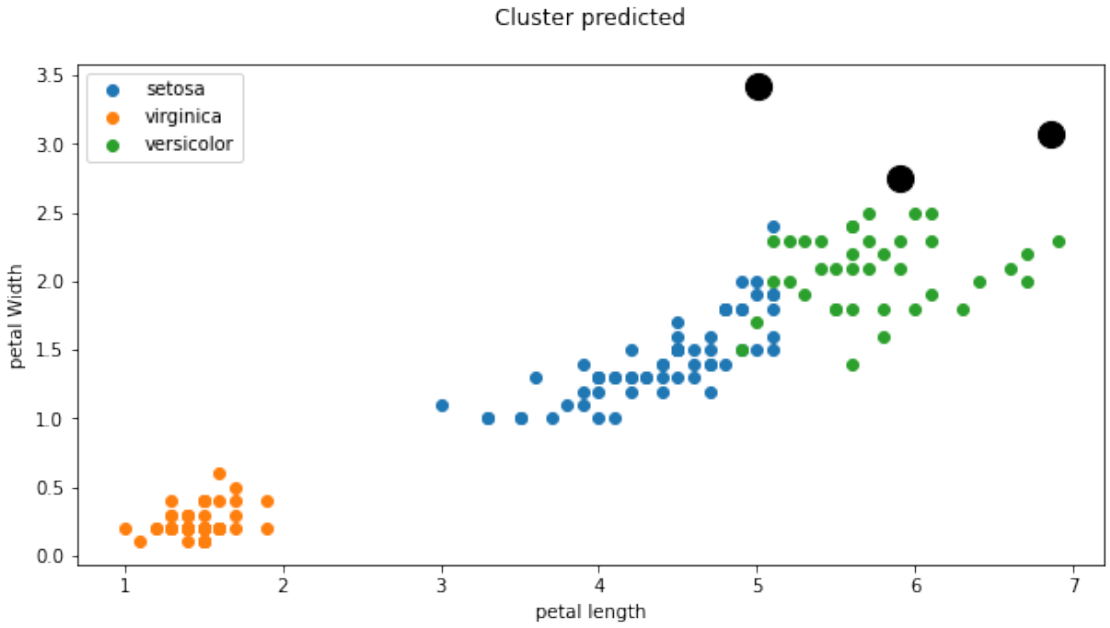
```
df=pd.DataFrame({'Cluster':range(1,10),'ic':ic})
plt.figure(figsize=(12,6))
plt.plot(df['Cluster'],df['ic'],marker='o',color='purple')
plt.xlabel('Number of Clusters')
plt.ylabel('IC')
plt.title('The elbow method')
plt.show()
```



Visualizing Centroids on the Clusters of columns sepalLength and sepalWidth :

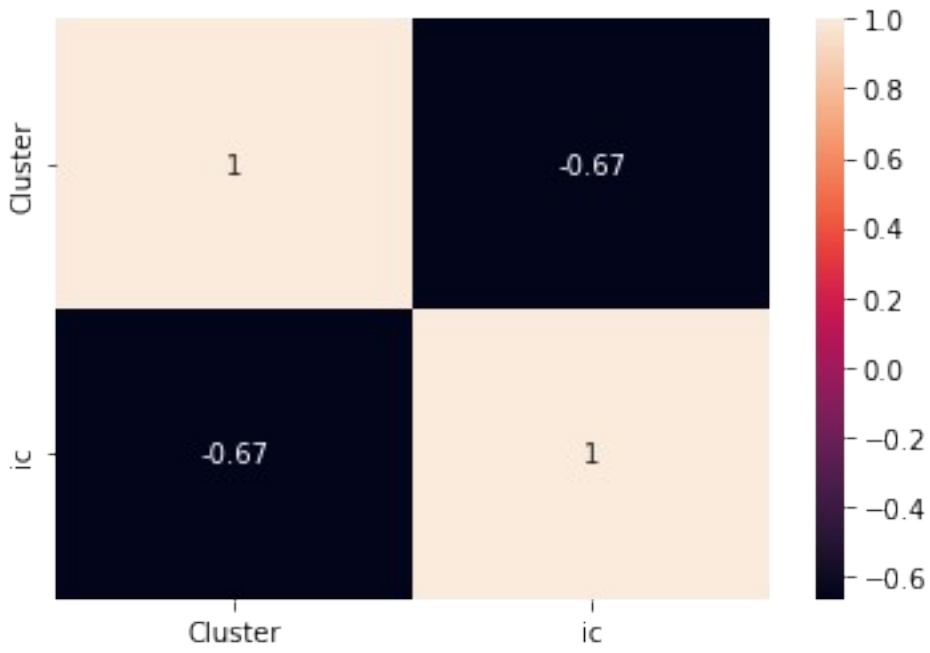
```
kmeans=KMeans(n_clusters=3, init='k-means++')
y_kmeans=kmeans.fit_predict(data.iloc[:,[0,1,2,3]].values)

x= data.iloc[:,[0,1,2,3]].values
plt.figure(figsize=(10,5))
plt.scatter(x[y_kmeans==0,0],x[y_kmeans==0,1],label='setosa')
plt.scatter(x[y_kmeans==1,0],x[y_kmeans==1,1],label='virginica')
plt.scatter(x[y_kmeans==2,0],x[y_kmeans==2,1],label='versicolor')
plt.legend()
plt.title('Cluster predicted\n')
plt.xlabel('Sepal length')
plt.ylabel('Sepal Width')
plt.scatter(kmeans.cluster_centers_[:,0],kmeans.cluster_centers_[:,1],
s=200,c='black',label='Centroids')
plt.show()

plt.figure(figsize=(10,5))
plt.scatter(x[y_kmeans==0,2],x[y_kmeans==0,3],label='setosa')
plt.scatter(x[y_kmeans==1,2],x[y_kmeans==1,3],label='virginica')
plt.scatter(x[y_kmeans==2,2],x[y_kmeans==2,3],label='versicolor')
plt.legend()
plt.title('Cluster predicted\n')
plt.xlabel('petal length')
plt.ylabel('petal Width')
plt.scatter(kmeans.cluster_centers_[:,0],kmeans.cluster_centers_[:,1],
s=200,c='black',label='Centroids')
plt.show()
```





Correlation Matrix :

```
sns.heatmap(df.corr(),annot= True)
plt.show()
```



Gaussians Naive Bayes Accuracy check :

```
x_data=data.reindex(columns=["sepal length","sepal width","petal
length","petal width"])
x_train,x_test,y_train,y_test=train_test_split(x_data,
data["class"],test_size=0.3,random_state=42)
```

```
from sklearn.naive_bayes import GaussianNB
gnb = GaussianNB()
gnb.fit(x_train, y_train)
print('Accuracy of Gaussians naive bayes classifiers on training set:
{:.2f}'.format(gnb.score(x_train,y_train)))
print('Accuracy of Gaussians naive bayes classifiers on test set:
{:.2f}'.format(gnb.score(x_test,y_test)))
```

```
Accuracy of Gaussians naive bayes classifiers on training set: 0.94
Accuracy of Gaussians naive bayes classifiers on test set: 0.98
```