Task 3 : Unsupervised Machine Learning

From the given 'Iris' dataset , predict the optimum number of clusters and represent it visually

Dataset: https://drive.google.com/file/d/11Iq7YvbWZbt8VXjfm06brx66b10YiwK-/view

Importing Libraries

In [1]:

```
#importing the required libraries
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from sklearn import datasets
```

Loading the dataset

In [2]:

```
iris = datasets.load_iris()
iris_df = pd.DataFrame(iris.data, columns = iris.feature_names)
iris_df.head(15)
```

Out[2]:

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)
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
5	5.4	3.9	1.7	0.4
6	4.6	3.4	1.4	0.3
7	5.0	3.4	1.5	0.2
8	4.4	2.9	1.4	0.2
9	4.9	3.1	1.5	0.1
10	5.4	3.7	1.5	0.2
11	4.8	3.4	1.6	0.2
12	4.8	3.0	1.4	0.1
13	4.3	3.0	1.1	0.1
14	5.8	4.0	1.2	0.2

In [3]:

```
iris_df.shape #shape of the dataset
```

Out[3]:

```
(150, 4)
```

In [4]:

```
iris_df.describe(include='all') #description of the dataset
```

Out[4]:

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)
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 [5]:

```
iris_df.info() #information about the dataset
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 150 entries, 0 to 149
Data columns (total 4 columns):
sepal length (cm)    150 non-null float64
sepal width (cm)     150 non-null float64
petal length (cm)    150 non-null float64
petal width (cm)     150 non-null float64
dtypes: float64(4)
memory usage: 4.8 KB
```

Finding the optimum number of clusters for k-means classification

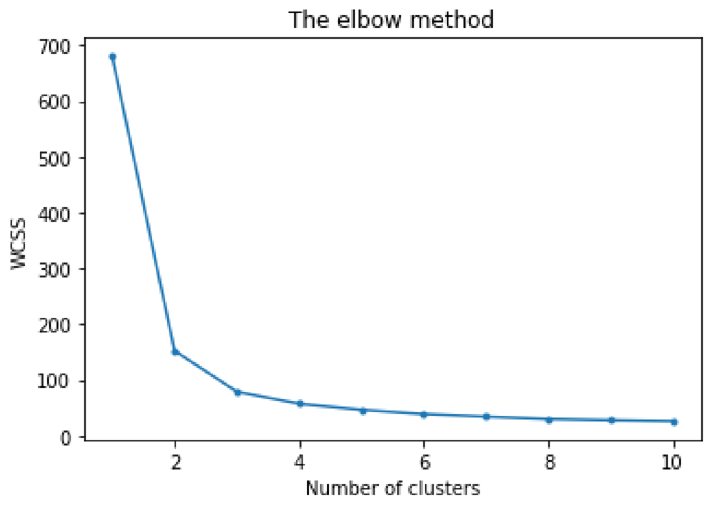
In [6]:

```
# Determining the optimum number of clusters using elbow method
x = iris_df.iloc[:, [0,1,2,3]].values

from sklearn.cluster import KMeans
wcss = []

for i in range(1,11):
  kmeans = KMeans(n_clusters = i, init = 'k-means++',  max_iter = 300, n_init = 10, rand
om_state = 0)
  kmeans.fit(x)
  wcss.append(kmeans.inertia_)

# Plotting the results onto a line graph,
# Allowing us to observe 'The elbow'
plt.plot(range(1, 11), wcss, marker='.')
plt.title('The elbow method')
plt.xlabel('Number of clusters')
plt.ylabel('WCSS') # Within cluster sum of squares
plt.show()
```



From this we choose the number of clusters as '3'.

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Creating the k means classifier

In [7]:

```
# Applying kmeans to the dataset
kmeans = KMeans(n_clusters = 3, init = 'k-means++', max_iter = 300, n_init = 10, random_
state = 0)
y_kmeans = kmeans.fit_predict(x)
```

Visualising the clusters

In [8]:

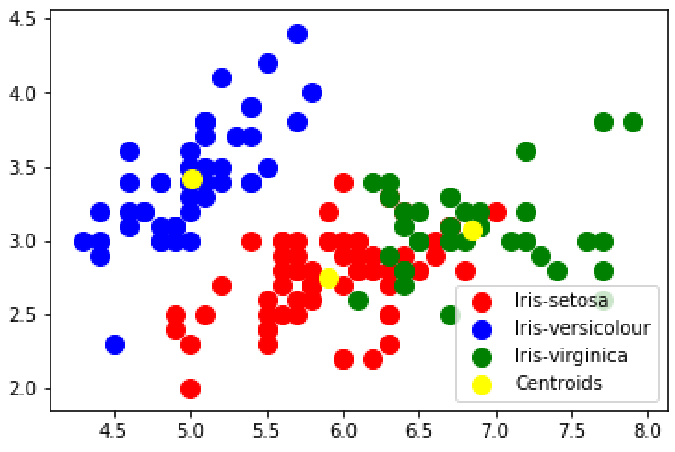
```
# Visualising the clusters - On the first two columns
plt.scatter(x[y_kmeans == 0, 0], x[y_kmeans == 0, 1], s = 100, c = 'red', label = 'Iris-
setosa')
plt.scatter(x[y_kmeans == 1, 0], x[y_kmeans == 1, 1], s = 100, c = 'blue', label = 'Iris
-versicolour')
plt.scatter(x[y_kmeans == 2, 0], x[y_kmeans == 2, 1], s = 100, c = 'green', label = 'Iri
s-virginica')

# Plotting the centroids of the clusters
plt.scatter(kmeans.cluster_centers_[:, 0], kmeans.cluster_centers_[:,1], s = 100, c = 'y
ellow', label = 'Centroids')

plt.legend()
```

Out[8]:

```
<matplotlib.legend.Legend at 0x2c52f549f28>
```



In [ ]: