Data Science & Business Analytics Internship

Task -2: Prediction using unsupervised ML

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problem statement:

From the given "iris" Dataset, predict the optimum number of cluster and represent it visually.

step1 - Importing nacessary libraries

In [1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
```

importing the Dataset

In [2]:
```
df = pd.read_csv("task_data")
df.head(10)
```

Out[2]:

	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	Species
0	1	5.1	3.5	1.4	0.2	Iris-setosa
1	2	4.9	3.0	1.4	0.2	Iris-setosa
2	3	4.7	3.2	1.3	0.2	Iris-setosa
3	4	4.6	3.1	1.5	0.2	Iris-setosa
4	5	5.0	3.6	1.4	0.2	Iris-setosa
5	6	5.4	3.9	1.7	0.4	Iris-setosa
6	7	4.6	3.4	1.4	0.3	Iris-setosa
7	8	5.0	3.4	1.5	0.2	Iris-setosa
8	9	4.4	2.9	1.4	0.2	Iris-setosa
9	10	4.9	3.1	1.5	0.1	Iris-setosa

check Any missing values

In [3]:
```
df.isnull().sum()
```

Out[3]:
```
Id               0
SepalLengthCm    0
SepalWidthCm     0
PetalLengthCm    0
PetalWidthCm     0
Species          0
dtype: int64
```

summary of Dataset

In [4]:
```
df.describe()
```

Out[4]:

	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm
count	150.000000	150.000000	150.000000	150.000000	150.000000
mean	75.500000	5.843333	3.054000	3.758667	1.198667
std	43.445368	0.828066	0.433594	1.764420	0.763161
min	1.000000	4.300000	2.000000	1.000000	0.100000
25%	38.250000	5.100000	2.800000	1.600000	0.300000
50%	75.500000	5.800000	3.000000	4.350000	1.300000
75%	112.750000	6.400000	3.300000	5.100000	1.800000
max	150.000000	7.900000	4.400000	6.900000	2.500000

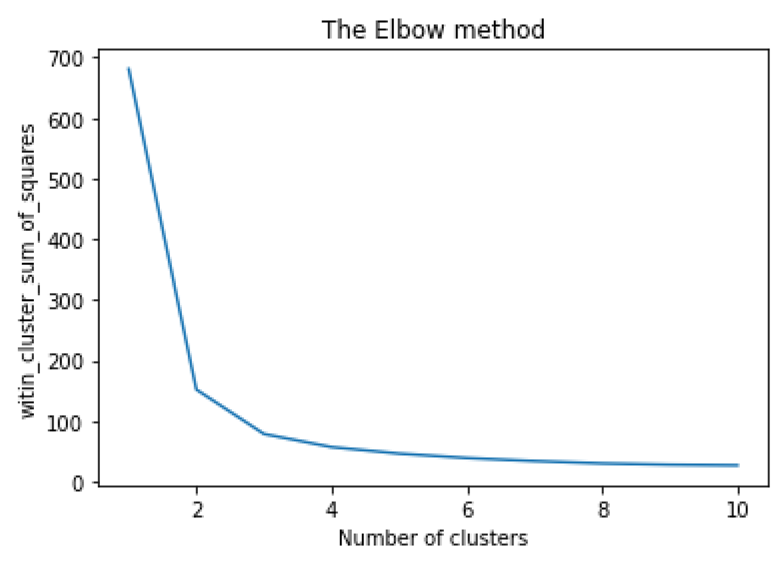
metadata of the data

In [5]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 150 entries, 0 to 149
Data columns (total 6 columns):
 #   Column         Non-Null Count  Dtype
---  ------         --------------  -----
 0   Id             150 non-null    int64
 1   SepalLengthCm  150 non-null    float64
 2   SepalWidthCm   150 non-null    float64
 3   PetalLengthCm  150 non-null    float64
 4   PetalWidthCm   150 non-null    float64
 5   Species        150 non-null    object
dtypes: float64(4), int64(1), object(1)
memory usage: 7.2+ KB
```

finding the number of optimum clusters using Elbow method

In [6]:
```
x = df.iloc[:,[1,2,3,4]].values

from sklearn.cluster import KMeans
wcss = [] #within_cluster_sum_of_squares

for i in range(1, 11):
    #model_1 = KMeans(n_clusters=i, init = 'k-means++', max_iter= 300, n_init=10,random_state=0)
    model_1 = KMeans(i)
    model_1.fit(x)
    wcss.append(model_1.inertia_)

#plt.figure(figsize=(16,9))
plt.plot(range(1, 11), wcss)
plt.title('The Elbow method')
plt.xlabel('Number of clusters')
plt.ylabel('witin_cluster_sum_of_squares')
plt.show()
```



so from the Above graph we define that the optimum number is 3

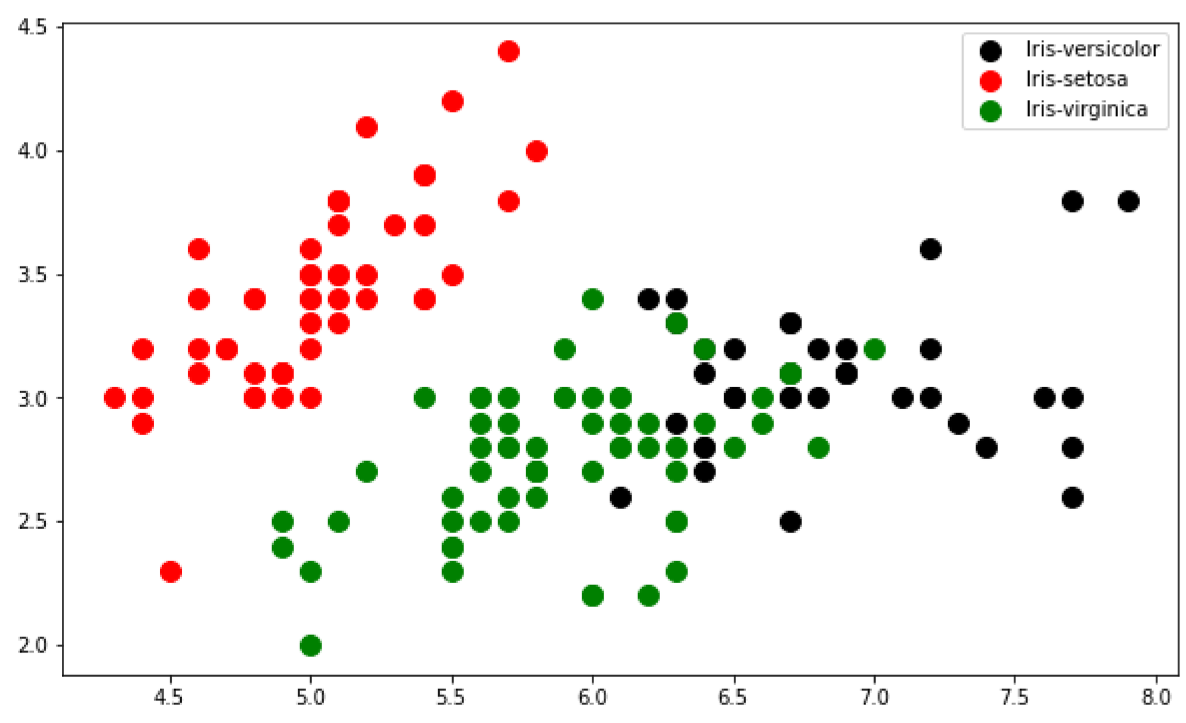
Applying kmeans clustring algorithm

In [7]:
```
model = KMeans(
    n_clusters=3,
    init='k-means++',
    n_init=10,
    max_iter=300,
    random_state=0)
y_pred = model.fit_predict(x)
y_pred
```

Out[7]:
```
array([1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 2, 2, 0, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2,
       2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 0, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2,
       2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 0, 2, 0, 0, 0, 0, 2, 0, 0, 0,
       0, 0, 0, 2, 2, 0, 0, 0, 0, 2, 0, 2, 0, 2, 0, 0, 2, 2, 0, 0, 0, 0,
       0, 2, 0, 0, 0, 0, 2, 0, 0, 0, 2, 0, 0, 0, 2, 0, 0, 2])
```

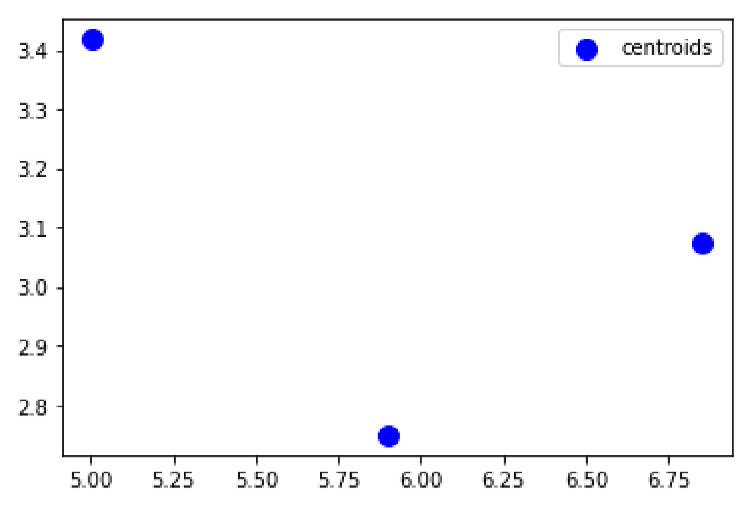
visualization of the given Data

In [8]:
```
plt.figure(figsize=(10,6))
plt.scatter(x[y_pred == 0, 0], x[y_pred == 0, 1],
            s = 100, c='black', label="Iris-versicolor")

plt.scatter(x[y_pred == 1, 0], x[y_pred == 1, 1],
            s = 100, c='red', label="Iris-setosa")

plt.scatter(x[y_pred == 2, 0], x[y_pred == 2, 1],
            s = 100, c='green', label="Iris-virginica")
plt.legend()
plt.show()
```



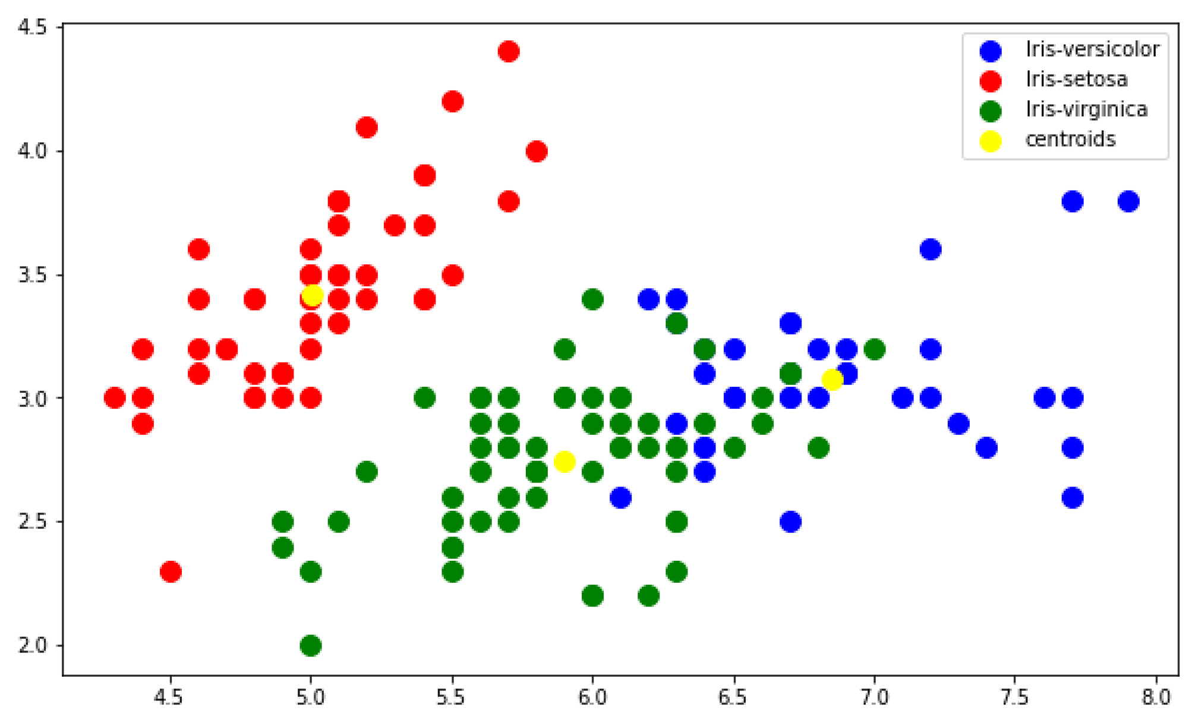
In [9]:
```
plt.scatter(model.cluster_centers_[:,0], model.cluster_centers_[:,1],
            s = 100, c='blue', label="centroids")

plt.legend()
```

Out[9]:
```
<matplotlib.legend.Legend at 0x1a74fab0700>
```



visualizing Total

In [10]:
```
plt.figure(figsize=(10,6))
plt.scatter(x[y_pred == 0, 0], x[y_pred == 0, 1],
            s = 100, c='blue', label="Iris-versicolor")

plt.scatter(x[y_pred == 1, 0], x[y_pred == 1, 1],
            s = 100, c='red', label="Iris-setosa")

plt.scatter(x[y_pred == 2, 0], x[y_pred == 2, 1],
            s = 100, c='green', label="Iris-virginica")

plt.scatter(model.cluster_centers_[:,0], model.cluster_centers_[:,1],
            s = 100, c='yellow', label="centroids")
plt.legend()
plt.show()
```



Thank You