# The Sparks Foundation Task 2 - Prediction using Unsupervised ML

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

# Iris Dataset

Iris dataset contains five columns such as Petal Length, Petal Width, Sepal Length, Sepal Width and Species Type. Iris is a flowering plant, the researchers have measured various features of the different iris flowers and recorded digitally

In [1]:
```
#importing all the required libraries
import warnings
warnings.filterwarnings("ignore")
import pandas as pd
import numpy as np
import matplotlib.pyplot as mt
from sklearn import datasets
%matplotlib inline
```

In [2]:
```
iris=datasets.load_iris()
df=pd.DataFrame(iris.data, columns=iris.feature_names)
df.head(150)
```

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 |

| | sepal length (cm) | sepal width (cm) | petal length (cm) | petal width (cm) |
|---|---|---|---|---|
| **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 |
| **...** | ... | ... | ... | ... |
| **145** | 6.7 | 3.0 | 5.2 | 2.3 |
| **146** | 6.3 | 2.5 | 5.0 | 1.9 |
| **147** | 6.5 | 3.0 | 5.2 | 2.0 |
| **148** | 6.2 | 3.4 | 5.4 | 2.3 |
| **149** | 5.9 | 3.0 | 5.1 | 1.8 |

150 rows × 4 columns

# K-Means Clustering

K-means clustering aims to partition data into k clusters in a way that data points in the same cluster are similar and data points in the different clusters are farther apart. The K-means algorithm identifies k number of centroids, and then allocates every data point to the nearest cluster, while keeping the centroids as small as possible.

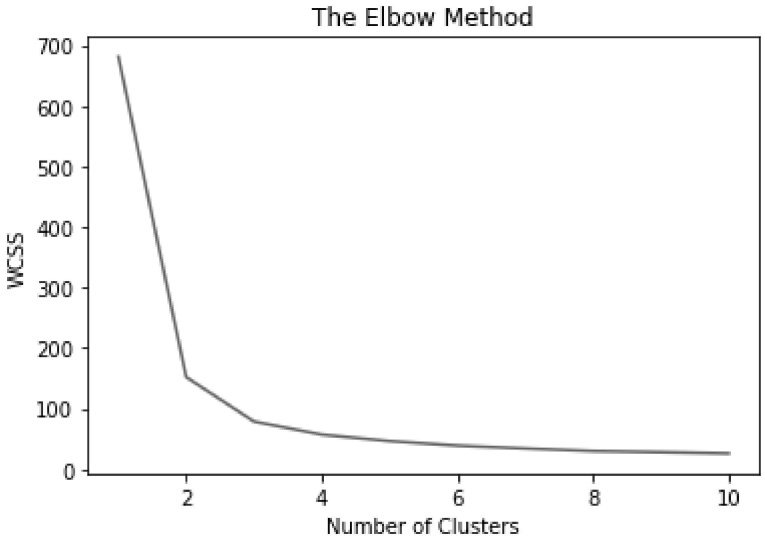
Inertia measures how well a dataset was clustered by K-Means. It is calculated by measuring the distance between each data point and its centroid, squaring this distance, and summing these squares across one cluster. A good model is one with low inertia AND a low number of clusters(K)

In [3]:

```
x=df.iloc[:,[0,1,2,3]].values
from sklearn.cluster import KMeans
list=[]

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

```
mt.plot(range(1,11),list)
mt.title("The Elbow Method")
mt.xlabel("Number of Clusters")
mt.ylabel("WCSS")
mt.show()
```




In [4]:
```
#creating the kmeans classifier
kmeans=KMeans(n_clusters=3, init='k-means++', max_iter=300, n_init=10, random_state=0)
y_kmeans=kmeans.fit_predict(x)
y_kmeans
```

Out[4]:
```
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, 0, 0, 2, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
       0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 2, 0, 0, 0, 0, 0, 0, 0, 0, 0,
       0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 2, 0, 2, 2, 2, 2, 0, 2, 2,
       2, 2, 2, 0, 0, 2, 2, 2, 2, 0, 2, 0, 2, 0, 2, 2, 0, 0, 2, 2, 2,
       2, 0, 2, 2, 2, 2, 0, 2, 2, 2, 0, 2, 2, 2, 0, 2, 2, 0])
```

In [5]:
```
#visualising th clusters
mt.scatter(x[y_kmeans==0,0], x[y_kmeans==0,1], s=100, c='steelblue', label='Iris-setosa')
mt.scatter(x[y_kmeans==1,0], x[y_kmeans==1,1], s=100, c='coral', label='Iris-versicolor')
mt.scatter(x[y_kmeans==2,0], x[y_kmeans==2,1], s=100, c='olive', label='Iris-verginica')

#plotting centriods of clusters
```

```
mt.scatter(kmeans.cluster_centers_[:,0], kmeans.cluster_centers_[:,1], s=100, c='black', label='Centriods')
mt.legend()
```

Out[5]: <matplotlib.legend.Legend at 0x1aa2b463ca0>