PREDICTION USING UNSUPERVISED ML

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

K-Means Clustering : K-Means clustering is a method of vector quantization, originally from signal processing, that aims to partition n observations into k clusters in which each observation belongs to the cluster with the nearest mean, serving as a prototype of the cluster.

Author: Ramchandra Darade

Importing required Libraries

In [5]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.cluster import KMeans

```

Loading the dataset

In [12]:

```
df= pd.read_csv("C:/Users/ARCHANA/Desktop/The Sparks Foundation/Iris.c
```

Data Exploration/ Understanding

In [13]:

```
df.head()
```

Out[13]:

	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

In [14]:
```
df.tail()
```

Out[14]:

	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	Species
145	146	6.7	3.0	5.2	2.3	Iris-virginica
146	147	6.3	2.5	5.0	1.9	Iris-virginica
147	148	6.5	3.0	5.2	2.0	Iris-virginica
148	149	6.2	3.4	5.4	2.3	Iris-virginica
149	150	5.9	3.0	5.1	1.8	Iris-virginica

In [16]:
```
df.describe()
```

Out[16]:

	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

In [18]:
```
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
```

In [20]:
```
df.isnull().sum()
```

Out[20]:
```
Id               0
SepalLengthCm    0
SepalWidthCm     0
PetalLengthCm    0
PetalWidthCm     0
Species          0
dtype: int64
```

In [62]:

```
# Extract the feature values (attributes) from the dataset
X = df.iloc[:, :4].values

```

In [63]:

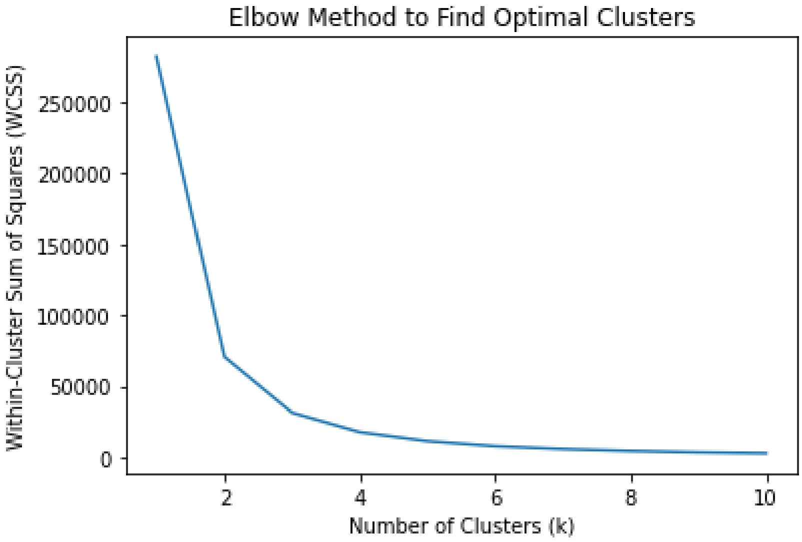
```
# Determine the optimal number of clusters using the Elbow method
# Within-cluster sum of squares
wcss = []
```

In [64]:

```
# Try different values of k (number of clusters)
for i in range(1, 11):
    kmeans = KMeans(n_clusters=i, init='k-means++', max_iter=300, n_in
    kmeans.fit(X)
    wcss.append(kmeans.inertia_)
```

In [65]:

```
# Plot the Elbow method graph to find the optimal k
plt.plot(range(1, 11), wcss)
plt.title('Elbow Method to Find Optimal Clusters')
plt.xlabel('Number of Clusters (k)')
plt.ylabel('Within-Cluster Sum of Squares (WCSS)')
plt.show()
```



In [66]:

```
# Based on the Elbow method, it looks like the optimal number of cluste

# Apply K-means clustering with k=3
kmeans = KMeans(n_clusters=3, init='k-means++', max_iter=300, n_init=1
y_kmeans = kmeans.fit_predict(X)
```

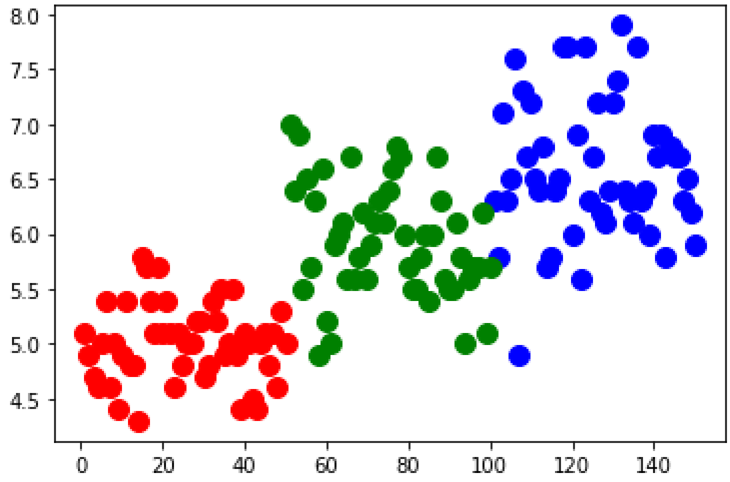
In [67]:

```
# Visualize the clusters
plt.scatter(X[y_kmeans == 0, 0], X[y_kmeans == 0, 1], s=100, c='red',
plt.scatter(X[y_kmeans == 1, 0], X[y_kmeans == 1, 1], s=100, c='blue',
plt.scatter(X[y_kmeans == 2, 0], X[y_kmeans == 2, 1], s=100, c='green'

```

Out[67]:

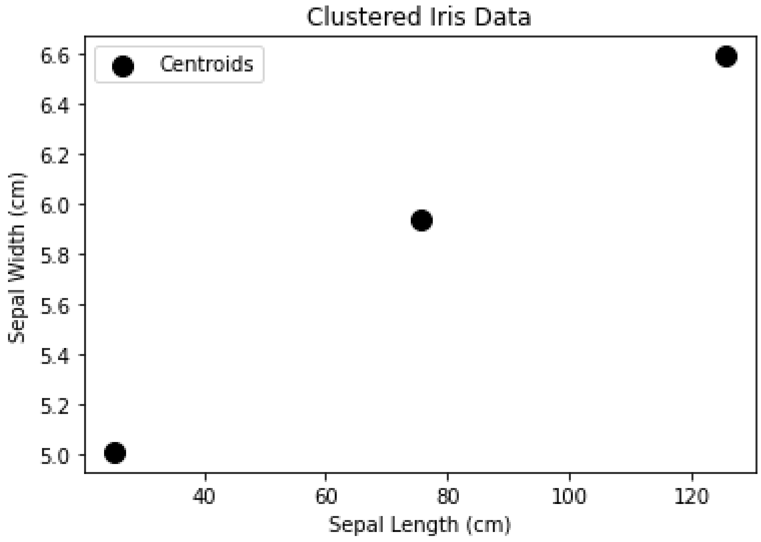
```
<matplotlib.collections.PathCollection at 0x25d93b79b40>
```



In [74]:

```
# Plot the centroids of the clusters
plt.scatter(kmeans.cluster_centers_[:, 0], kmeans.cluster_centers_[:,

plt.title('Clustered Iris Data')
plt.xlabel('Sepal Length (cm)')
plt.ylabel('Sepal Width (cm)')
plt.legend()
plt.show()
```



In [ ]:

```

```