Data Science and Business Analytics Task 2

In [2]:

```
#Importing required libraries
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
from sklearn.cluster import KMeans

#To ignore warnings
import warnings as wg
wg.filterwarnings("ignore")
```

Reading data from Iris dataset

In [3]:

```
#Reading data from Iris dataset
df=pd.read_csv('Iris.csv')
```

Visualising data

In [4]:

```
df.head()
```

Out[4]:

	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 [5]:

```
df.tail()
```

Out[5]:

	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 [7]:

```
df.shape
```

Out[7]:

```
(150, 6)
```

In [8]:

```
df.columns
```

Out[8]:

```
Index(['Id', 'SepalLengthCm', 'SepalWidthCm', 'PetalLengthCm', 'PetalWidthCm',
       'Species'],
      dtype='object')
```

In [9]:

```
df['Species'].unique()
```

Out[9]:

```
array(['Iris-setosa', 'Iris-versicolor', 'Iris-virginica'], dtype=object)
```

In [10]:

```
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 [11]:

```
df.describe()
```

Out[11]:

	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 [12]:

```
iris=pd.DataFrame(df)
iris_df= iris.drop(columns=['Species','Id'])
iris_df.head()
```

Out[12]:

	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm
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

Finding optimum number of clusters

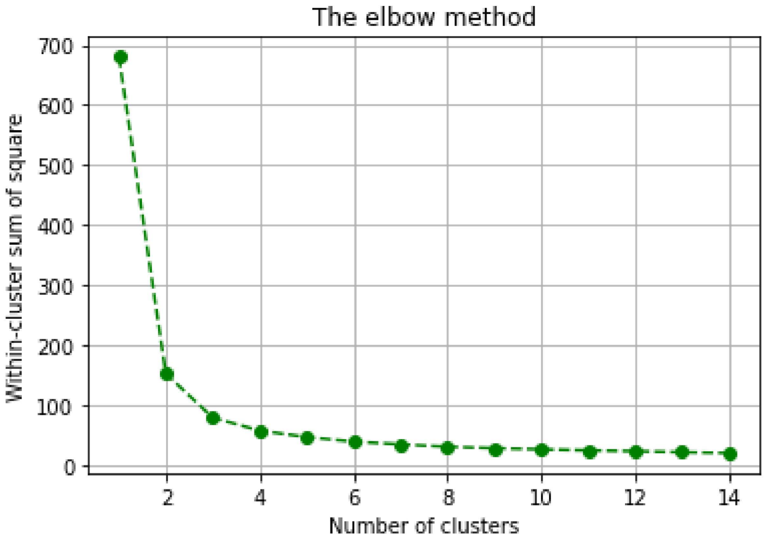
The Elbow Method

In [15]:

```
#Calculating the within-cluster sum of square

within_cluster_sum_of_square=[]

clusters_range=range(1,15)
for k in clusters_range:
    km=KMeans(n_clusters=k)
    km=km.fit(iris_df)
    within_cluster_sum_of_square.append(km.inertia_)
```

In [16]:

```
#Plotting the "Within-cluster sum of square" against cluster range

plt.plot(clusters_range,within_cluster_sum_of_square,'go--',color='green')
plt.title('The elbow method')
plt.xlabel('Number of clusters')
plt.ylabel('Within-cluster sum of square')
plt.grid()
plt.show()
```



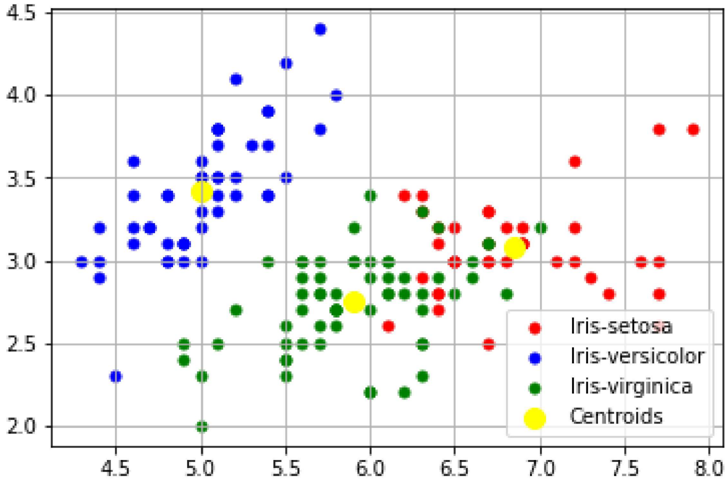
In [17]:

```
from sklearn.cluster import KMeans

model=KMeans(n_clusters=3,init='k-means++', max_iter=300, n_init=10, random_state=0)
predictions= model.fit_predict(iris_df)
```

Plotting cluster centers

In [21]:

```
x=iris_df.iloc[:,[0,1,2,3]].values
plt.scatter(x[predictions==0,0],x[predictions==0,1],s=25,c='red',label='Iris-setosa')
plt.scatter(x[predictions==1,0],x[predictions==1,1],s=25,c='blue',label='Iris-versicolo
plt.scatter(x[predictions==2,0],x[predictions==2,1],s=25,c='green',label='Iris-virginic
#Plotting the cluster centers
plt.scatter(model.cluster_centers_[:,0], model.cluster_centers_[:,1],s=100, c='yellow',
plt.legend()
plt.grid()
plt.show()
```


Iris-setosa
Iris-versicolor
Iris-virginica
Centroids