TSF TASK 2 - GRIP MARCH'21

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Prediction Using Unsupervised ML

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

The Sparks Foundation GRIP MARCH'21

Step 1 - Importing Libraries

In [1]:
```
import pandas as pan
import numpy as ny
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.datasets import load_iris
from sklearn.cluster import KMeans
import warnings
warnings.filterwarnings('ignore')
```

Step 2 - Load the iris dataset

In [2]:
```
data = load_iris()
data_x_df= pan.DataFrame(ny.column_stack((data.data, data.target)), columns = data.feat
data_x_df['label'] = data_x_df.target.replace(dict(enumerate(data.target_names)))
data_x_df.head()
```

Out[2]:

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)	target	label
0	5.1	3.5	1.4	0.2	0.0	setosa
1	4.9	3.0	1.4	0.2	0.0	setosa
2	4.7	3.2	1.3	0.2	0.0	setosa
3	4.6	3.1	1.5	0.2	0.0	setosa
4	5.0	3.6	1.4	0.2	0.0	setosa

In [3]:
```
# Viewing the last 5 rows of our dataset
data_x_df.tail()
```

Out[3]:

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)	target	label
145	6.7	3.0	5.2	2.3	2.0	virginica
146	6.3	2.5	5.0	1.9	2.0	virginica
147	6.5	3.0	5.2	2.0	2.0	virginica
148	6.2	3.4	5.4	2.3	2.0	virginica

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)	target	label
149	5.9	3.0	5.1	1.8	2.0	virginica

Step 3 - Calulating number of rows and coloumns

In [4]:
```
data_x_df.shape
```

Out[4]:
```
(150, 6)
```

Step 4 - Checking for any null value in our dataset

In [5]:
```
data_x_df.isnull()
```

Out[5]:

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)	target	label
0	False	False	False	False	False	False
1	False	False	False	False	False	False
2	False	False	False	False	False	False
3	False	False	False	False	False	False
4	False	False	False	False	False	False
...	...	...	...	...	...	...
145	False	False	False	False	False	False
146	False	False	False	False	False	False
147	False	False	False	False	False	False
148	False	False	False	False	False	False
149	False	False	False	False	False	False

150 rows × 6 columns

Step 5 - Checking for some more information on our dataset

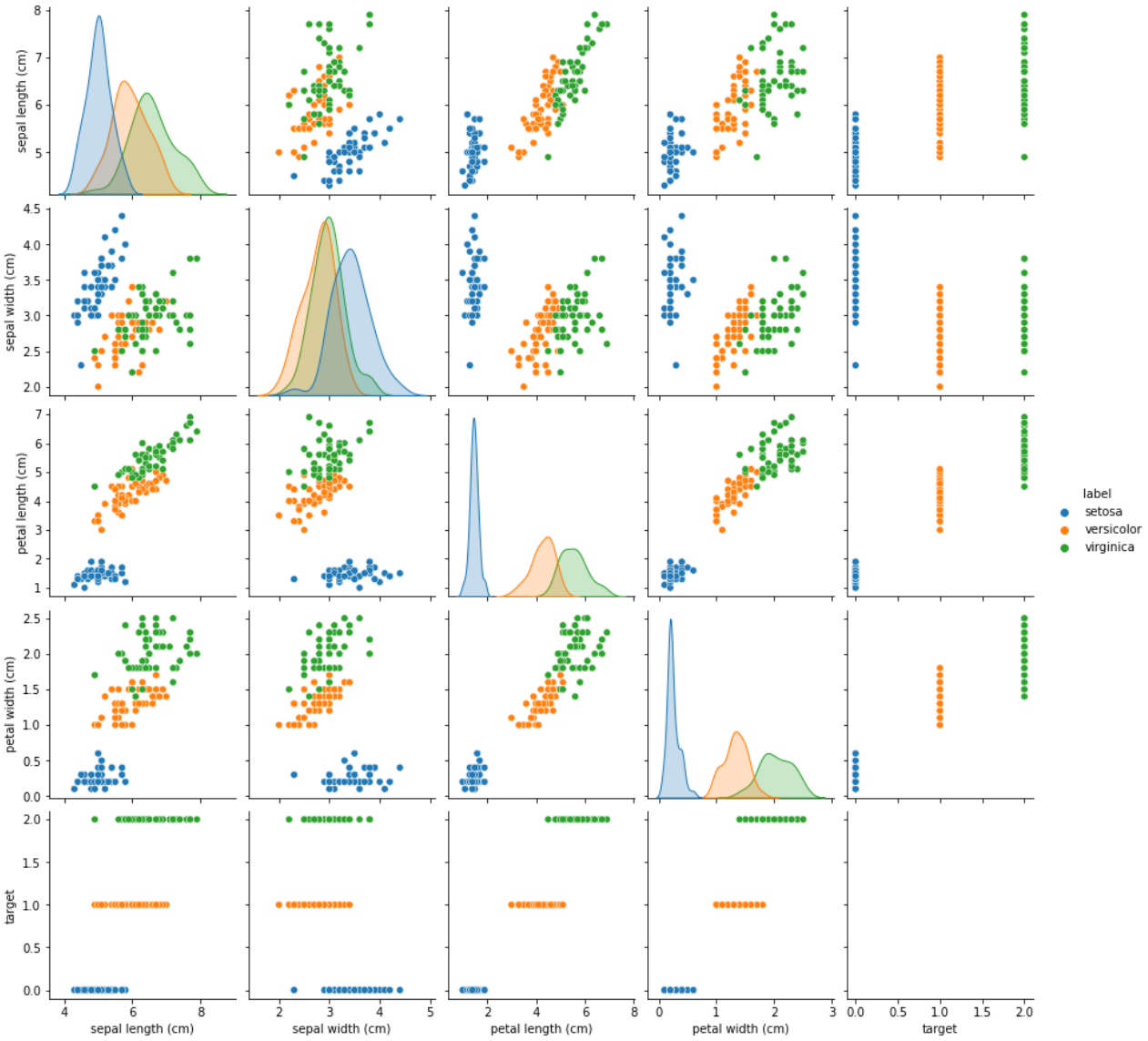
In [6]:
```
data_x_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 150 entries, 0 to 149
Data columns (total 6 columns):
 #   Column             Non-Null Count  Dtype  
---  ------             --------------  -----  
 0   sepal length (cm)  150 non-null    float64
 1   sepal width (cm)   150 non-null    float64
 2   petal length (cm)  150 non-null    float64
 3   petal width (cm)   150 non-null    float64
 4   target             150 non-null    float64
 5   label              150 non-null    object 
dtypes: float64(5), object(1)
memory usage: 7.2+ KB
```

Step 6 - Using seaborn to plot the pair plot

In [7]:
```
sns.pairplot(data_x_df, hue='label')
```

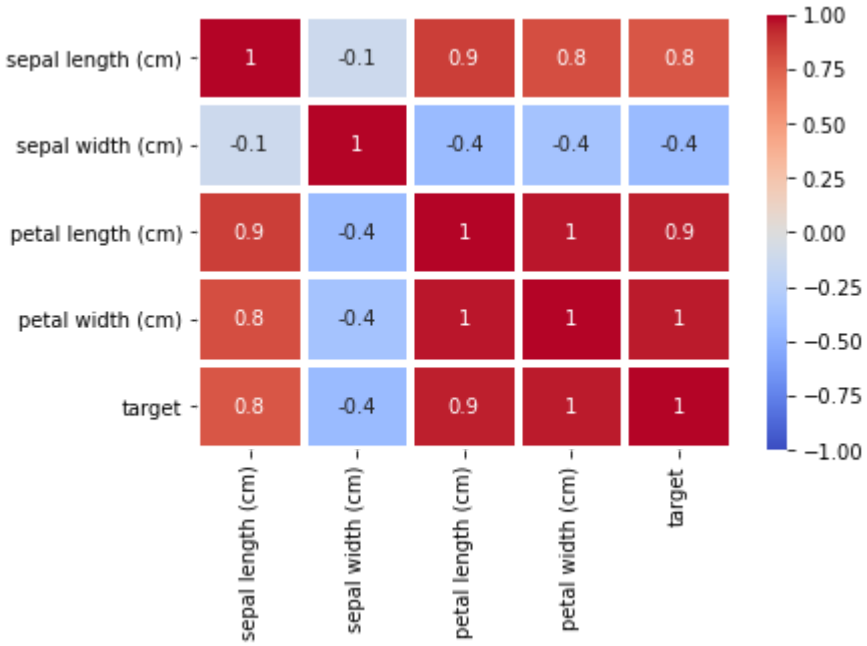
Out[7]: <seaborn.axisgrid.PairGrid at 0xdb55cbe190>



Step 7 - Plotting te correlation matrix

In [8]:
```
sns.heatmap(data_x_df.corr(),annot=True,fmt='.1g',cmap='coolwarm',vmin=-1,vmax=1,linewi
```

Out[8]: <AxesSubplot:>



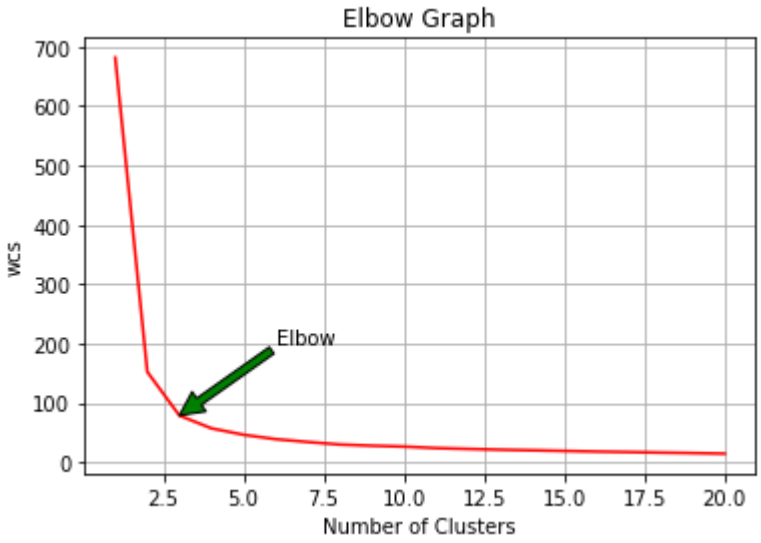
Step 8 - 'ELBOW' method to find optimum number of clusters

In [9]:
```
x = data_x_df.iloc[:,[0,1,2,3]].values
wcs = []
for i in range(1, 21):
    model = KMeans(n_clusters = i, init = 'k-means++',
                   max_iter = 250, n_init = 15, random_state = 0)
    model.fit(x)
    wcs.append(model.inertia_)
print(wcs)
```

```
[681.3705999999996, 152.34795176035797, 78.851441426146, 57.25600931571815, 46.446182051
28204, 39.03998724608725, 34.29822966507179, 30.014398496240617, 28.03690635345049, 26.5
34529220779234, 24.017409798327492, 22.611814560232254, 21.29261112885971, 20.2977500177
4859, 19.211721918432456, 18.147461141799383, 17.35341513878279, 16.44187692862693, 15.6
28506387403455, 14.667646358543427]
```

Step 9 - Plotting the elbow graph

In [10]:
```
plt.plot(range(1, 21), wcs, color = 'r')
plt.title('Elbow Graph')
plt.xlabel('Number of Clusters')
plt.ylabel('wcs')
plt.annotate('Elbow', xytext=(6,200), xy=(3,79), arrowprops={'facecolor':'green'})
plt.grid()
plt.show()
```



Elbow occurs where the line graph bends and wcs does not decrease significantly with every iteration. Elbow occurs at number of clusters = 3 which is equal to optimum number of clusters.

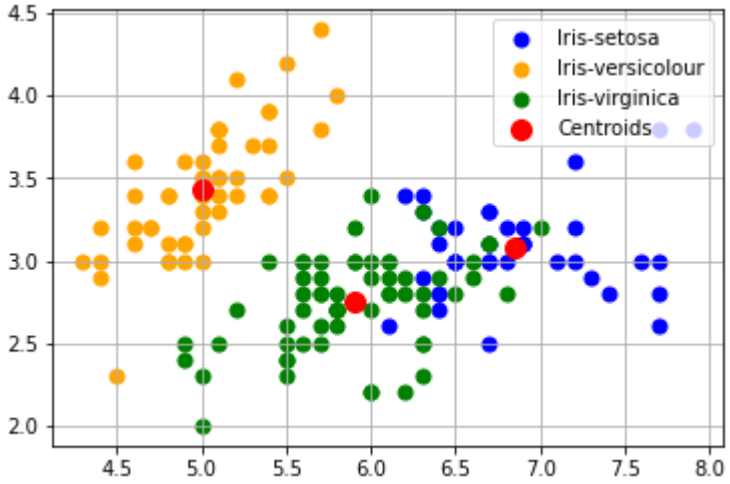
Step 10 - Creating kmeans classifier

In [11]:
```
model = KMeans(n_clusters = 3, init = 'k-means++',
               max_iter = 250, n_init = 15, random_state = 0)
y = model.fit_predict(x)
print(y)
```

```
[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 2 0 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]
```

In [12]:
```
# Plotting the three clusters of first two columns(sepal length, sepal width)
plt.scatter(x[y == 0, 0], x[y == 0, 1],
            s = 50, c = 'blue', label = 'Iris-setosa')
plt.scatter(x[y == 1, 0], x[y == 1, 1],
            s = 50, c = 'orange', label = 'Iris-versicolour')
plt.scatter(x[y == 2, 0], x[y == 2, 1],
            s = 50, c = 'green', label = 'Iris-virginica')

# Plotting the centroids of each clusters
plt.scatter(model.cluster_centers_[:, 0], model.cluster_centers_[:,1],
            s = 100, c = 'red', label = 'Centroids')
plt.legend(loc=1)
plt.grid()
```


Iris-setosa
Iris-versicolour
Iris-virginica
Centroids
4.5
4.0
3.5
3.0
2.5
2.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0

In [ ]: