In [2]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
#from google.colab import files
from sklearn.preprocessing import OneHotEncoder
from sklearn.compose import ColumnTransformer
from sklearn.pipeline import Pipeline
from sklearn.preprocessing import StandardScaler
from sklearn.cluster import KMeans
```

In [4]:

```
iris=pd.read_csv('E:\internship DS\Iris.csv')
```

In [5]:

```
iris.set_index('Id',inplace=True)
```

In [6]:

```
iris.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 150 entries, 1 to 150
Data columns (total 5 columns):
 #   Column         Non-Null Count  Dtype  
---  ------         --------------  -----  
 0   SepalLengthCm  150 non-null    float64
 1   SepalWidthCm   150 non-null    float64
 2   PetalLengthCm  150 non-null    float64
 3   PetalWidthCm   150 non-null    float64
 4   Species        150 non-null    object 
dtypes: float64(4), object(1)
memory usage: 7.0+ KB
```

In [7]:

```
iris.describe()
```

Out[7]:

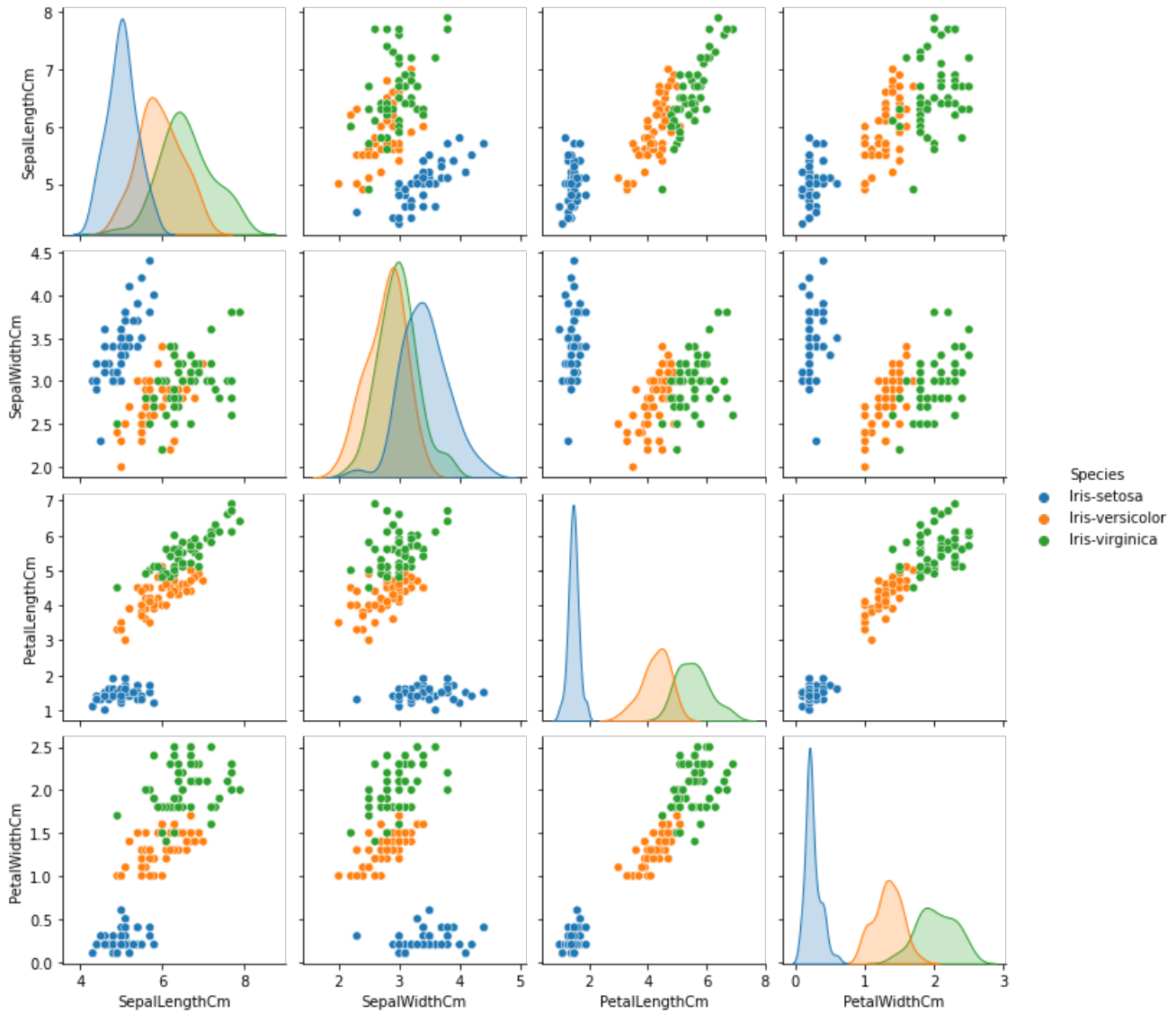
	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm
count	150.000000	150.000000	150.000000	150.000000
mean	5.843333	3.054000	3.758667	1.198667
std	0.828066	0.433594	1.764420	0.763161
min	4.300000	2.000000	1.000000	0.100000
25%	5.100000	2.800000	1.600000	0.300000
50%	5.800000	3.000000	4.350000	1.300000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

In [8]:

```
sns.pairplot(iris,hue='Species')
```

Out[8]:

```
<seaborn.axisgrid.PairGrid at 0x1e7b1406d48>
```



In [9]:

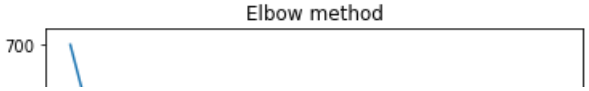
```
num_attributes=['SepalLengthCm','SepalWidthCm','PetalLengthCm','PetalWidthCm']
cat_attributes=['Species']
num_pipeline=Pipeline([('std_scaler', StandardScaler()),])
cat_pipeline=Pipeline([("one_hot_enc",OneHotEncoder()),])
full_pipeline=ColumnTransformer([
    ("num",num_pipeline,num_attributes),
    ("cat",cat_pipeline,cat_attributes)
])
iris_encoded=full_pipeline.fit_transform(iris)
```

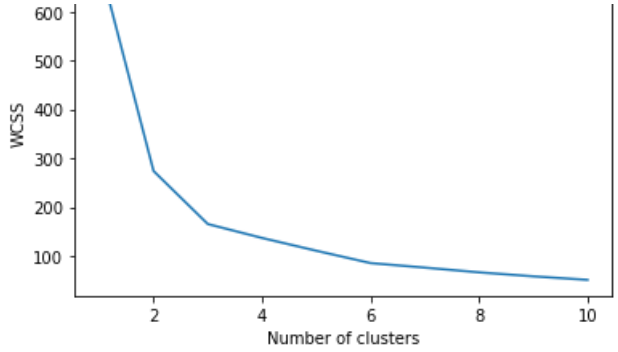
In [10]:

```
wcss=[]
for i in range(1,11):
  kmeans=KMeans(n_clusters=i,init='k-means++',random_state=5)
  kmeans.fit(iris_encoded)
  wcss.append(kmeans.inertia_)
plt.plot(range(1,11),wcss)
plt.title('Elbow method')
plt.xlabel('Number of clusters')
plt.ylabel('WCSS')
```

Out[10]:

```
Text(0, 0.5, 'WCSS')
```





In [11]:

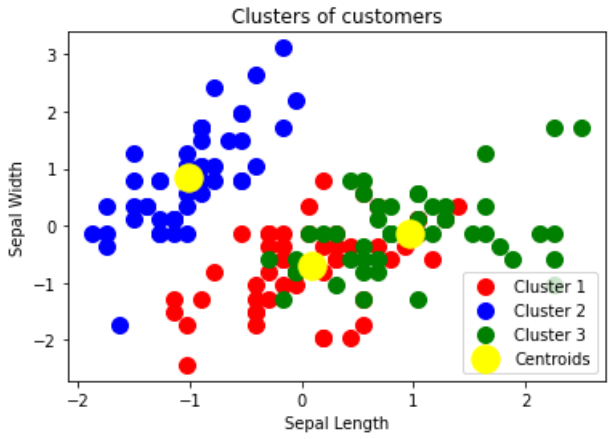
```
kmeans=KMeans(n_clusters=3,init='k-means++',random_state=5)
cluster_no=kmeans.fit_predict(iris_encoded)
cluster_no
```

Out[11]:

```
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, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
       0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
       0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 2, 2, 2, 2, 2, 2, 0, 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, 2, 2, 2, 2, 2, 2, 2, 2])
```

In [12]:

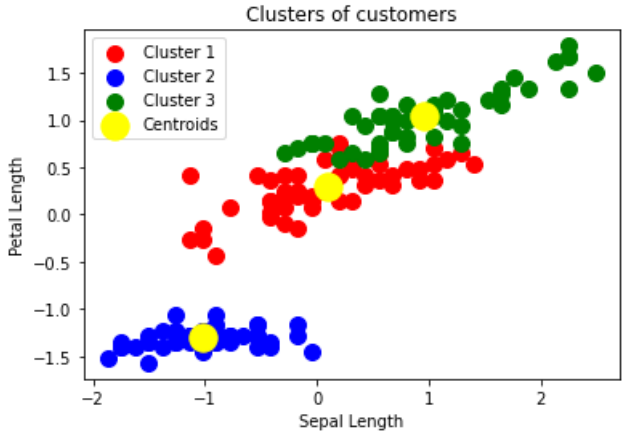
```
plt.scatter(iris_encoded[cluster_no == 0, 0], iris_encoded[cluster_no == 0, 1], s = 100, c = 'red',
label = 'Cluster 1')
plt.scatter(iris_encoded[cluster_no == 1, 0], iris_encoded[cluster_no == 1, 1], s = 100, c = 'blue'
, label = 'Cluster 2')
plt.scatter(iris_encoded[cluster_no == 2, 0], iris_encoded[cluster_no == 2, 1], s = 100, c = 'green
', label = 'Cluster 3')
plt.scatter(kmeans.cluster_centers_[:, 0], kmeans.cluster_centers_[:, 1], s = 300, c = 'yellow', la
bel = 'Centroids')
plt.title('Clusters of customers')
plt.xlabel('Sepal Length')
plt.ylabel('Sepal Width')
plt.legend()
plt.show()
```



In [13]:

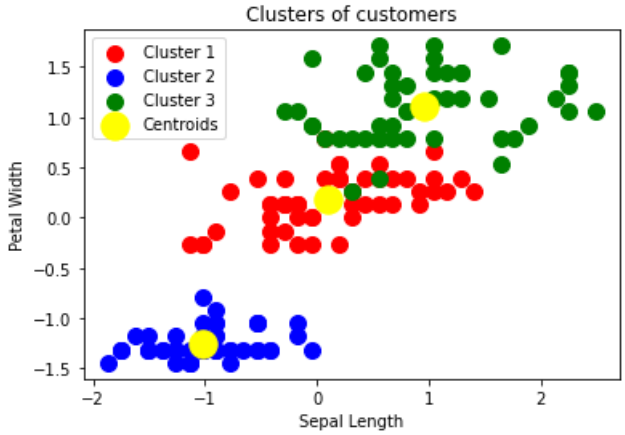
```
plt.scatter(iris_encoded[cluster_no == 0, 0], iris_encoded[cluster_no == 0, 2], s = 100, c = 'red',
label = 'Cluster 1')
plt.scatter(iris_encoded[cluster_no == 1, 0], iris_encoded[cluster_no == 1, 2], s = 100, c = 'blue'
, label = 'Cluster 2')
plt.scatter(iris_encoded[cluster_no == 2, 0], iris_encoded[cluster_no == 2, 2], s = 100, c = 'green
', label = 'Cluster 3')
plt.scatter(kmeans.cluster_centers_[:, 0], kmeans.cluster_centers_[:, 2], s = 300, c = 'yellow', la
bel = 'Centroids')
```

```
plt.title('Clusters of customers')
plt.xlabel('Sepal Length')
plt.ylabel('Petal Length')
plt.legend()
plt.show()
```



In [14]:

```
plt.scatter(iris_encoded[cluster_no == 0, 0], iris_encoded[cluster_no == 0, 3], s = 100, c = 'red',
label = 'Cluster 1')
plt.scatter(iris_encoded[cluster_no == 1, 0], iris_encoded[cluster_no == 1, 3], s = 100, c = 'blue'
, label = 'Cluster 2')
plt.scatter(iris_encoded[cluster_no == 2, 0], iris_encoded[cluster_no == 2, 3], s = 100, c = 'green
', label = 'Cluster 3')
plt.scatter(kmeans.cluster_centers_[:, 0], kmeans.cluster_centers_[:, 3], s = 300, c = 'yellow', la
bel = 'Centroids')
plt.title('Clusters of customers')
plt.xlabel('Sepal Length')
plt.ylabel('Petal Width')
plt.legend()
plt.show()
```

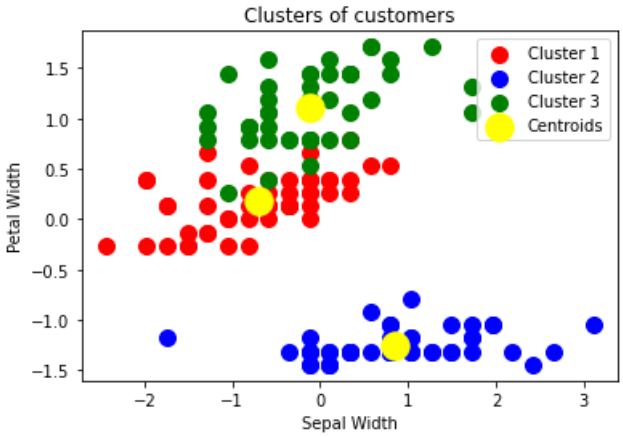


In [15]:

```
plt.scatter(iris_encoded[cluster_no == 0, 1], iris_encoded[cluster_no == 0, 2], s = 100, c = 'red',
label = 'Cluster 1')
plt.scatter(iris_encoded[cluster_no == 1, 1], iris_encoded[cluster_no == 1, 2], s = 100, c = 'blue'
, label = 'Cluster 2')
plt.scatter(iris_encoded[cluster_no == 2, 1], iris_encoded[cluster_no == 2, 2], s = 100, c = 'green
', label = 'Cluster 3')
plt.scatter(kmeans.cluster_centers_[:, 1], kmeans.cluster_centers_[:, 2], s = 300, c = 'yellow', la
bel = 'Centroids')
plt.title('Clusters of customers')
plt.xlabel('Sepal Width')
plt.ylabel('Petal length')
plt.legend()
plt.show()
```

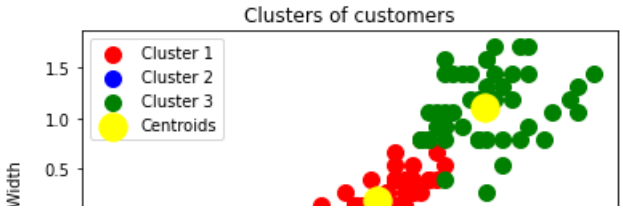
In [16]:

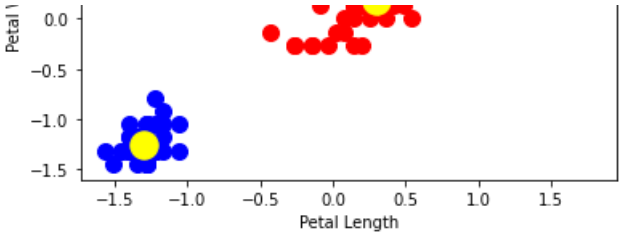
```
plt.scatter(iris_encoded[cluster_no == 0, 1], iris_encoded[cluster_no == 0, 3], s = 100, c = 'red',
label = 'Cluster 1')
plt.scatter(iris_encoded[cluster_no == 1, 1], iris_encoded[cluster_no == 1, 3], s = 100, c = 'blue'
, label = 'Cluster 2')
plt.scatter(iris_encoded[cluster_no == 2, 1], iris_encoded[cluster_no == 2, 3], s = 100, c = 'green
', label = 'Cluster 3')
plt.scatter(kmeans.cluster_centers_[:, 1], kmeans.cluster_centers_[:, 3], s = 300, c = 'yellow', la
bel = 'Centroids')
plt.title('Clusters of customers')
plt.xlabel('Sepal Width')
plt.ylabel('Petal Width')
plt.legend()
plt.show()
```



In [17]:

```
plt.scatter(iris_encoded[cluster_no == 0, 2], iris_encoded[cluster_no == 0, 3], s = 100, c = 'red',
label = 'Cluster 1')
plt.scatter(iris_encoded[cluster_no == 1, 2], iris_encoded[cluster_no == 1, 3], s = 100, c = 'blue'
, label = 'Cluster 2')
plt.scatter(iris_encoded[cluster_no == 2, 2], iris_encoded[cluster_no == 2, 3], s = 100, c = 'green
', label = 'Cluster 3')
plt.scatter(kmeans.cluster_centers_[:, 2], kmeans.cluster_centers_[:, 3], s = 300, c = 'yellow', la
bel = 'Centroids')
plt.title('Clusters of customers')
plt.xlabel('Petal Length')
plt.ylabel('Petal Width')
plt.legend()
plt.show()
```





In [ ]: