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TE IT

Batch : D

2018140059

ML - Exp 5 - Wine Quality Classification Daataset

```
#importing necessary libraries
import numpy as np
import pandas as pd
import warnings
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn import metrics
from sklearn.neural_network import MLPClassifier
import matplotlib.pyplot as plt
from sklearn.cluster import KMeans
```

```
from google.colab import drive
drive.mount("/content/gdrive")
```

```
Drive already mounted at /content/gdrive; to attempt to forcibly remount, call drive.mount("/content/gdrive
```

```
wine = pd.read_csv('/content/gdrive/My Drive/datasets/wine.csv',encoding= 'unicode_escape')
```

```
wine.head()
```

	fixed acidity	volatile acidity	citric acid	residual sugar	chlorides	free sulfur dioxide	total sulfur dioxide	density	pH	sulphates	alcohol	qua
0	7.4	0.70	0.00	1.9	0.076	11.0	34.0	0.9978	3.51	0.56	9.4	
1	7.8	0.88	0.00	2.6	0.098	25.0	67.0	0.9968	3.20	0.68	9.8	
2	7.8	0.76	0.04	2.3	0.092	15.0	54.0	0.9970	3.26	0.65	9.8	
3	11.2	0.28	0.56	1.9	0.075	17.0	60.0	0.9980	3.16	0.58	9.8	

```
wine.isnull().sum()
```

```
fixed acidity           0
volatile acidity        0
citric acid             0
residual sugar          0
chlorides               0
free sulfur dioxide     0
total sulfur dioxide    0
density                 0
pH                      0
sulphates               0
alcohol                 0
quality                 0
dtype: int64
```

```
# plt.figure(figsize=(40,25))
```

```
# plt.subplots_adjust(left=0, bottom=0.5, right=0.9, top=0.9, wspace=0.5, hspace=0.8)
# plt.subplot(141)
# plt.title('Percentage of good and bad quality wine',fontsize = 20)
# wine['quality'].value_counts().plot.pie(autopct="%1.1f%%")


wine.drop(['quality'], axis=1, inplace=True)



wine.head()
```

	fixed acidity	volatile acidity	citric acid	residual sugar	chlorides	free sulfur dioxide	total sulfur dioxide	density	pH	sulphates	alcohol
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3	11.2	0.28	0.56	1.9	0.075	17.0	60.0	0.9980	3.16	0.58	9.8

```
X = wine.iloc[:,[8,10]]
# X=wine



X
```

	pH	alcohol
0	3.51	9.4
1	3.20	9.8
2	3.26	9.8
3	3.16	9.8
4	3.51	9.4
...	...	...
1594	3.45	10.5
1595	3.52	11.2
1596	3.42	11.0
1597	3.57	10.2
1598	3.39	11.0

1599 rows × 2 columns

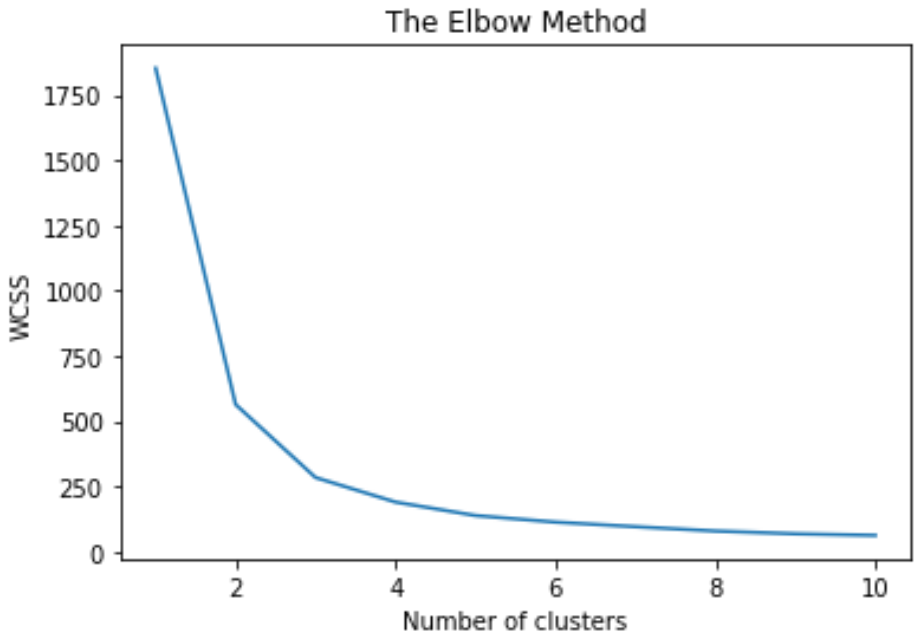
```
X = X.values


X
```

```
array([[ 3.51,  9.4 ],
       [ 3.2 ,  9.8 ],
       [ 3.26,  9.8 ],
       ...,
       [ 3.42, 11.  ],
       [ 3.57, 10.2 ],
       [ 3.39, 11.  ]])


wcss = []
for i in range(1, 11):
```

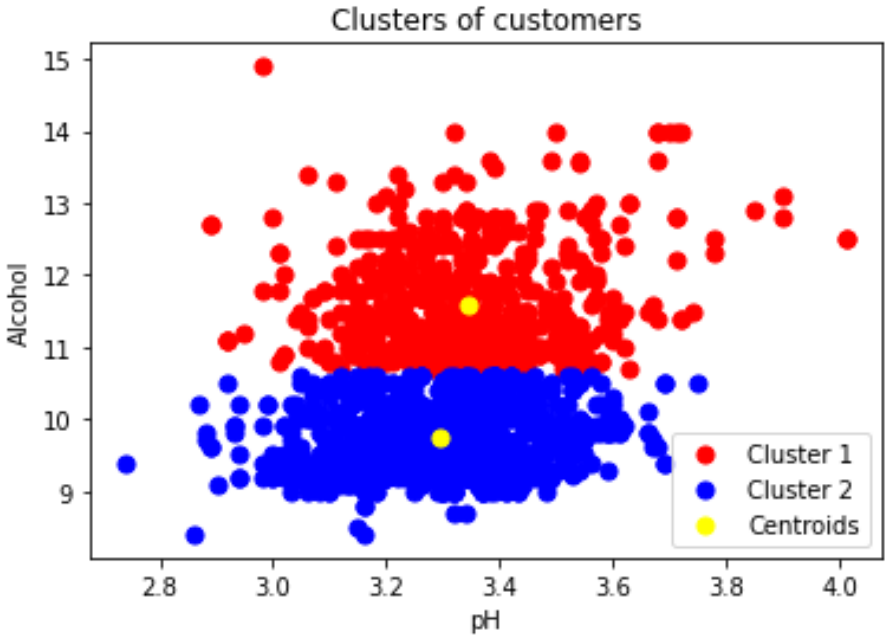
```
 kmeans = KMeans(n_clusters = i, init = 'k-means++', random_state = 42)
 kmeans.fit(X)
 wcss.append(kmeans.inertia_)
plt.plot(range(1, 11), wcss)
plt.title('The Elbow Method')
plt.xlabel('Number of clusters')
plt.ylabel('WCSS')
plt.show()
```




```
kmeans = KMeans(n_clusters = 2, init = 'k-means++', random_state = 42)
y_kmeans = kmeans.fit_predict(X)



plt.scatter(X[y_kmeans == 0, 0], X[y_kmeans == 0, 1], s = 50, c = 'red', label = 'Cluster 1')
plt.scatter(X[y_kmeans == 1, 0], X[y_kmeans == 1, 1], s = 50, c = 'blue', label = 'Cluster 2')
# plt.scatter(X[y_kmeans == 2, 0], X[y_kmeans == 2, 1], s = 50, c = 'green', label = 'Cluster 3')
# plt.scatter(X[y_kmeans == 3, 0], X[y_kmeans == 3, 1], s = 50, c = 'cyan', label = 'Cluster 4')
# plt.scatter(X[y_kmeans == 4, 0], X[y_kmeans == 4, 1], s = 50, c = 'magenta', label = 'Cluster 5')
plt.scatter(kmeans.cluster_centers_[:, 0], kmeans.cluster_centers_[:, 1], s = 50, c = 'yellow', label = 'Centroi
plt.title('Clusters of customers')
plt.xlabel('pH')
plt.ylabel('Alcohol')
plt.legend()
plt.show()
```




```
kmeans = KMeans(n_clusters = 3, init = 'k-means++', random_state = 42)
y_kmeans = kmeans.fit_predict(X)


y_kmeans
```

```
array([0, 0, 0, ..., 2, 0, 2], dtype=int32)
```

```
plt.scatter(X[y_kmeans == 0, 0], X[y_kmeans == 0, 1], s = 50, c = 'red', label = 'Cluster 1')
plt.scatter(X[y_kmeans == 1, 0], X[y_kmeans == 1, 1], s = 50, c = 'blue', label = 'Cluster 2')
plt.scatter(X[y_kmeans == 2, 0], X[y_kmeans == 2, 1], s = 50, c = 'green', label = 'Cluster 3')
# plt.scatter(X[y_kmeans == 3, 0], X[y_kmeans == 3, 1], s = 50, c = 'cyan', label = 'Cluster 4')
# plt.scatter(X[y_kmeans == 4, 0], X[y_kmeans == 4, 1], s = 50, c = 'magenta', label = 'Cluster 5')
plt.scatter(kmeans.cluster_centers_[:, 0], kmeans.cluster_centers_[:, 1], s = 50, c = 'yellow', label = 'Centroi
plt.title('Clusters of customers')
plt.xlabel('pH')
plt.ylabel('Alcohol')
plt.legend()
plt.show()
```