```
# 10  Plot the cluster data using python visualizations.
from sklearn.datasets import load_digits
from sklearn.decomposition import PCA
from sklearn.cluster import KMeans
import numpy as np
data = load_digits().data
print(data)
pca = PCA(2)
```

```
[[ 0.  0.  5. ...  0.  0.  0.]
 [ 0.  0.  0. ... 10.  0.  0.]
 [ 0.  0.  0. ... 16.  9.  0.]
 ...
 [ 0.  0.  1. ...  6.  0.  0.]
 [ 0.  0.  2. ... 12.  0.  0.]
 [ 0.  0. 10. ... 12.  1.  0.]]
```

```
df = pca.fit_transform(data)
df
```

```
array([[ -1.2594668 ,  21.2748827 ],
       [  7.95761055, -20.76869699],
       [  6.99192373,  -9.95598477],
       ...,
       [ 10.80128419,  -6.96025882],
       [ -4.87210056,  12.42396585],
       [ -0.34438856,   6.36554123]])
```

```
df.shape
(1797, 2)
from sklearn.cluster import KMeans
kmeans = KMeans(n_clusters= 10)
label = kmeans.fit_predict(df)
print(label)
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_
  warnings.warn(
[0 9 1 ... 1 2 7]
```

```
import matplotlib.pyplot as plt
filtered_label0 = df[label == 0]
plt.scatter(filtered_label0[:,0] , filtered_label0[:,1])
plt.show()
```
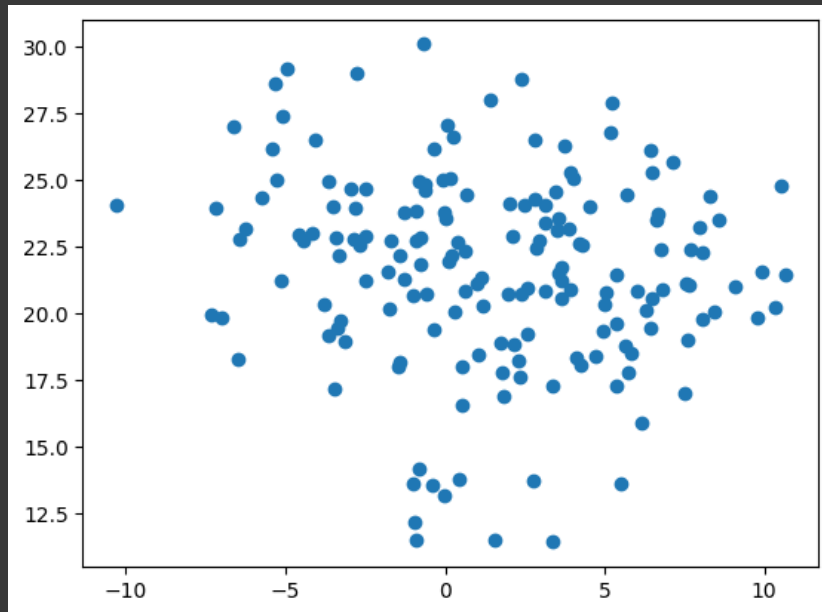
```
filtered_label2 = df[label == 2]
filtered_label8 = df[label == 8]
plt.scatter(filtered_label2[:,0] , filtered_label2[:,1] , color =
'red')
plt.scatter(filtered_label8[:,0] , filtered_label8[:,1] , color =
'black')
plt.show()
```

```
u_labels = np.unique(label)
for i in u_labels:
 plt.scatter(df[label == i , 0] , df[label == i , 1] , label = i)
plt.legend()
plt.show()
```
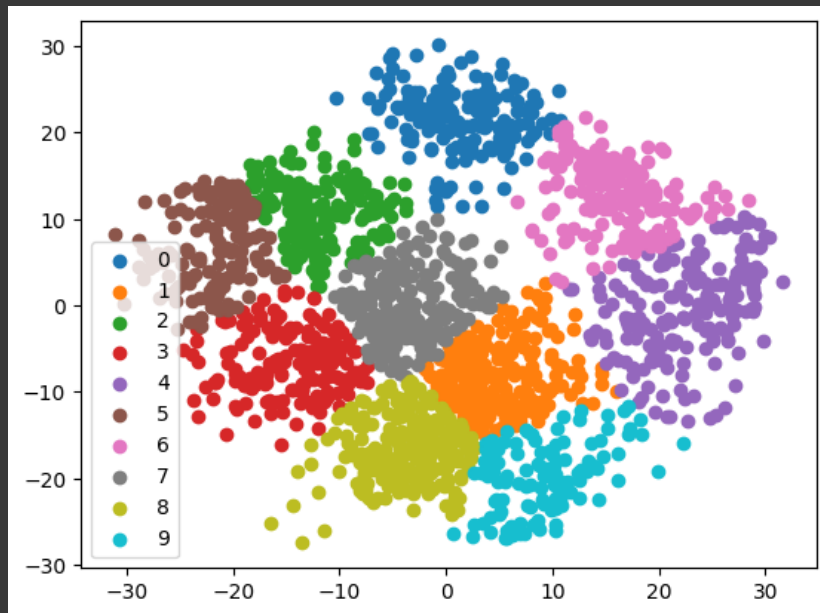


```
centroids = kmeans.cluster_centers_
u_labels = np.unique(label)
for i in u_labels:
 plt.scatter(df[label == i , 0] , df[label == i , 1] , label = i)
 plt.scatter(centroids[:,0] , centroids[:,1] , s = 80, color = 'k')
plt.legend()
plt.show()
```