

```
import matplotlib.pyplot as plt

from sklearn import datasets

from sklearn.cluster import KMeans

import pandas as pd

import numpy as np


iris = datasets.load_iris()

X = pd.DataFrame(iris.data)

X.columns = ['Sepal_Length', 'Sepal_Width', 'Petal_Length', 'Petal_Width']

y = pd.DataFrame(iris.target)

y.columns = ['Targets']


model = KMeans(n_clusters=3)

model.fit(X)


plt.figure(figsize=(14,14))

colormap = np.array(['red', 'lime', 'black'])


plt.subplot(2, 2, 1)

plt.scatter(X.Petal_Length, X.Petal_Width, c=colormap[y.Targets], s=40)

plt.title('Real Clusters')

plt.xlabel('Petal Length')

plt.ylabel('Petal Width')


plt.subplot(2, 2, 2)

plt.scatter(X.Petal_Length, X.Petal_Width, c=colormap[model.labels_], s=40)

plt.title('K-Means Clustering')

plt.xlabel('Petal Length')

plt.ylabel('Petal Width')
```

```
from sklearn import preprocessing

scaler = preprocessing.StandardScaler()

scaler.fit(X)

xsa = scaler.transform(X)

xs = pd.DataFrame(xsa, columns = X.columns)
```

```
from sklearn.mixture import GaussianMixture

gmm = GaussianMixture(n_components=3)

gmm.fit(xs)

gmm_y = gmm.predict(xs)
```

```
plt.subplot(2, 2, 3)

plt.scatter(X.Petal_Length, X.Petal_Width, c=colormap[gmm_y], s=40)

plt.title('GMM Clustering')

plt.xlabel('Petal Length')

plt.ylabel('Petal Width')
```

```
print('Observation: The GMM using EM algorithm based clustering matched the true labels more closely than the Kmeans.')
```