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ASSIGNMENT NO : 3.3

Perform k-means clusterization on the Iris dataset. Repeat the procedure on the dataset reduced with PCA, and then compare the results.

Solution:

Step#1:

First of all we have to import the necessary libraries.

```
[6]: import numpy as np
     import pandas as pd
     import matplotlib.pyplot as plt
     from sklearn.cluster import KMeans
     from sklearn.datasets import load_iris
     from sklearn.decomposition import PCA
```

Step#2:

After that we load the iris data set.

```
iris = load_iris()
X = iris.data
y = iris.target
```

Step#3:

 We Performed k-means clustering with 3 clusters on the original dataset.

```
kmeans = KMeans(n_clusters=3, random_state=42, n_init=10)
y_pred_original = kmeans.fit_predict(X)
```

Step # 4:

Applying PCA to reduce the dimensionality of the dataset to 2.

```
pca = PCA(n_components=2)
X_reduced = pca.fit_transform(X)
```

Step # 5:

Performing k-means clustering with 3 clusters on the reduced dataset.

```
kmeans = KMeans(n_clusters=3, random_state=42, n_init=10)
y_pred_reduced = kmeans.fit_predict(X_reduced)
```

Step # 6:

First we plot the clustering results for the original dataset.

```
plt.figure(figsize=(8, 6))
plt.scatter(X[:, 0], X[:, 1], c=y_pred_original, cmap='viridis')
plt.title('K-means clustering on the original Iris dataset')
plt.xlabel('Sepal length (cm)')
plt.ylabel('Sepal width (cm)')
plt.show()
```
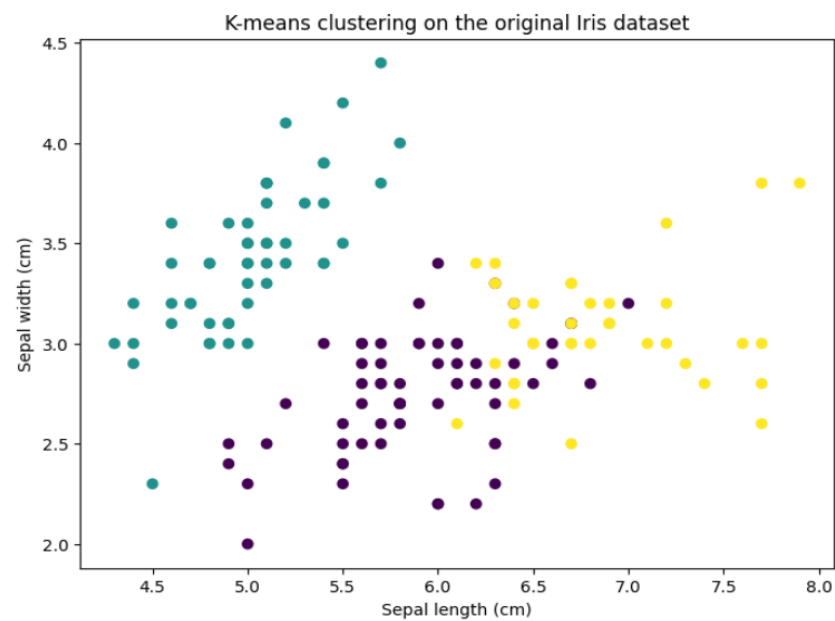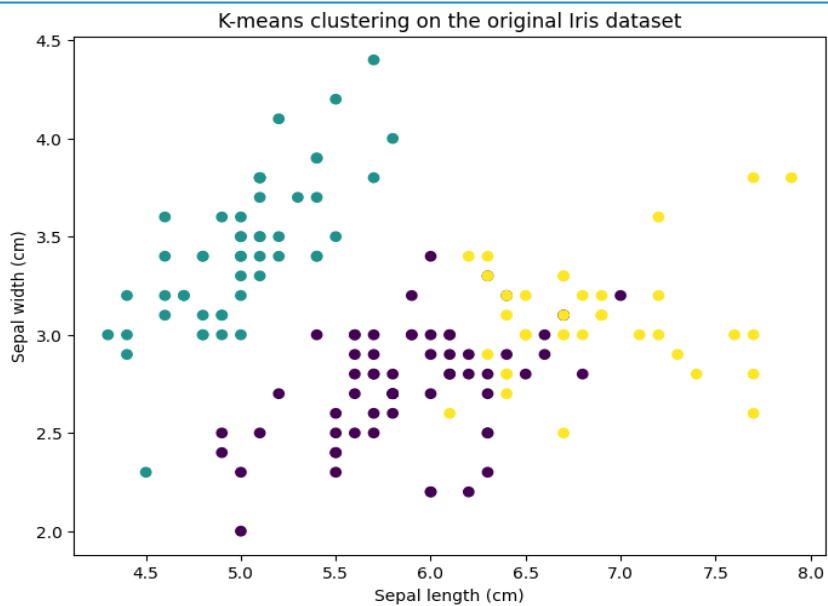

After that Ploting the clustering results for the reduced dataset.

```
plt.figure(figsize=(8, 6))
plt.scatter(X_reduced[:, 0], X_reduced[:, 1], c=y_pred_reduced, cmap='viridis')
plt.title('K-means clustering on the reduced Iris dataset')
plt.xlabel('PC 1')
plt.ylabel('PC 2')
plt.show()
```


K-means clustering on the reduced Iris dataset
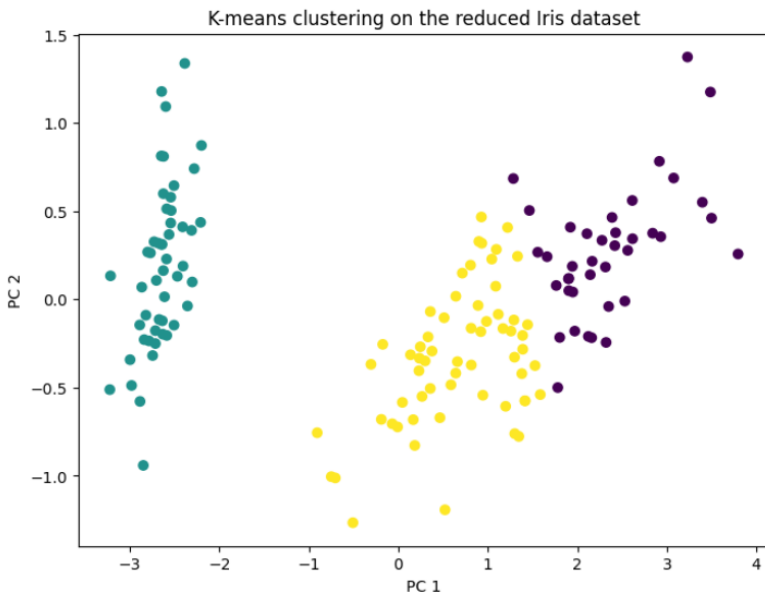
Comparision:

K- means clustering on original:

K-means clustering on the original Iris dataset

On reduced iris dataset:

K-means clustering on the reduced Iris dataset