Unit 3.3 Assignment Unsupervised Machine Learning

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Solution

In [134…
```
#First imported the necessary libraries
import matplotlib.pyplot as plt
import numpy as np
from sklearn import datasets
```

In [135…
```
iris = datasets.load_iris() # Load the Iris dataset
```

In [136…
```
# Extract the features and target variable from the dataset
x = iris.data
y = iris.target
```

K-means

In [137…
```
# Import the KMeans class from the scikit-learn cluster module

from sklearn.cluster import KMeans
```

In [138…
```
# Perform k-means clustering on the original dataset
# Create an instance of the KMeans class with specified hyperparameters
model = KMeans(n_clusters=3, n_init=1, max_iter=100)
model.fit(x)# Fit the KMeans model to the data

all_predictions = model.predict(x) # Use the trained model to make predic

centroids = model.cluster_centers_ # Get the coordinates of the cluster c
```

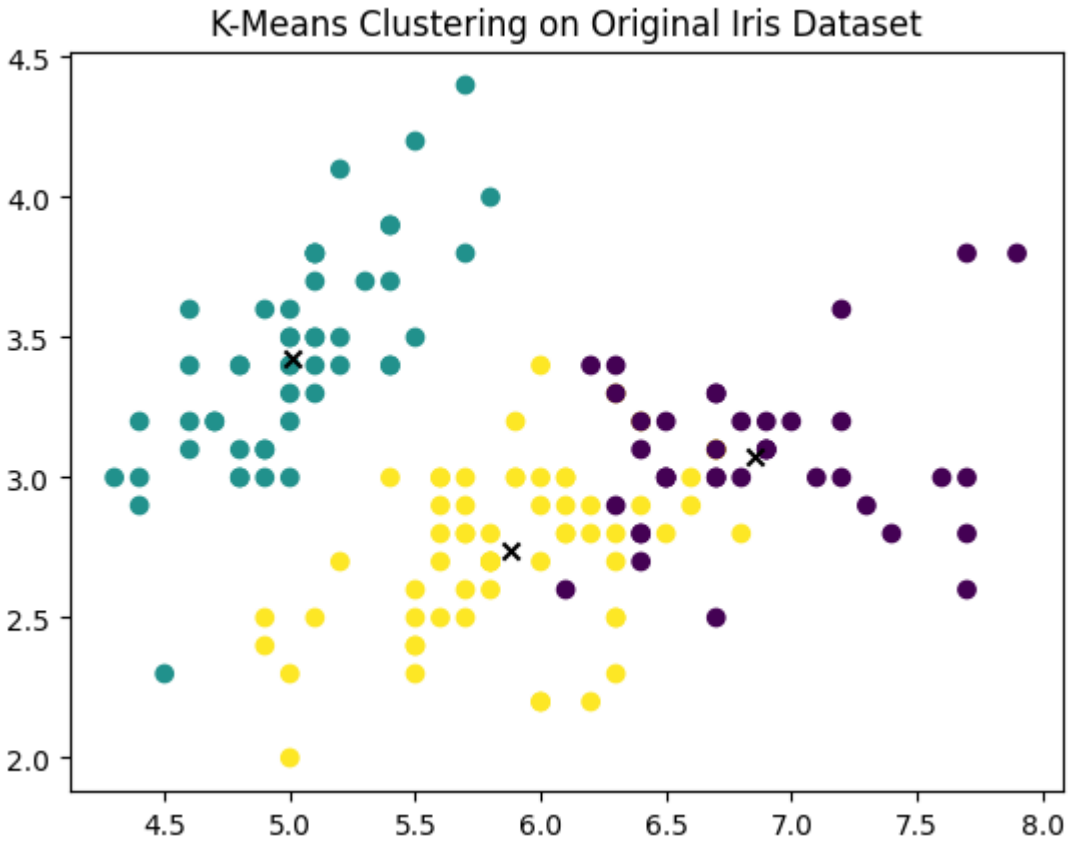
In [139…
```
centroids
```

Out[139]:
```
array([[6.85384615, 3.07692308, 5.71538462, 2.05384615],
       [5.006     , 3.428     , 1.462     , 0.246     ],
       [5.88360656, 2.74098361, 4.38852459, 1.43442623]])
```

In [140…
```
# Visualize the clustering results using a scatter plot
plt.scatter(x[:,0], x[:,1], c=all_predictions)
# Add the cluster centroids to the scatter plot
plt.scatter(centroids[:,0], centroids[:,1], marker='x', color="black")
```

```
plt.title('K-Means Clustering on Original Iris Dataset')
plt.show
```

Out[140]: <function matplotlib.pyplot.show(close=None, block=None)>



In [ ]:

K-means with Reduced dataset with PCA

PCA

In [122…
```
# Import the PCA class from the scikit-learn library

from sklearn.decomposition import PCA
```

In [123…
```
iris = datasets.load_iris() # Load the Iris dataset
```

In [124…
```
x.shape
```

Out[124]: (150, 4)

In [125…
```
# Create a PCA object with 2 components
pca = PCA(n_components=2)

# Fit the PCA object to the Iris dataset and transform the data to the ne

x_reduced = pca.fit_transform(x)

x_reduced.shape
```

Out[125]: (150, 2)

Now performing KMeans Clustering on Reduced data with PCA

In [126…
```
from sklearn.cluster import KMeans
```

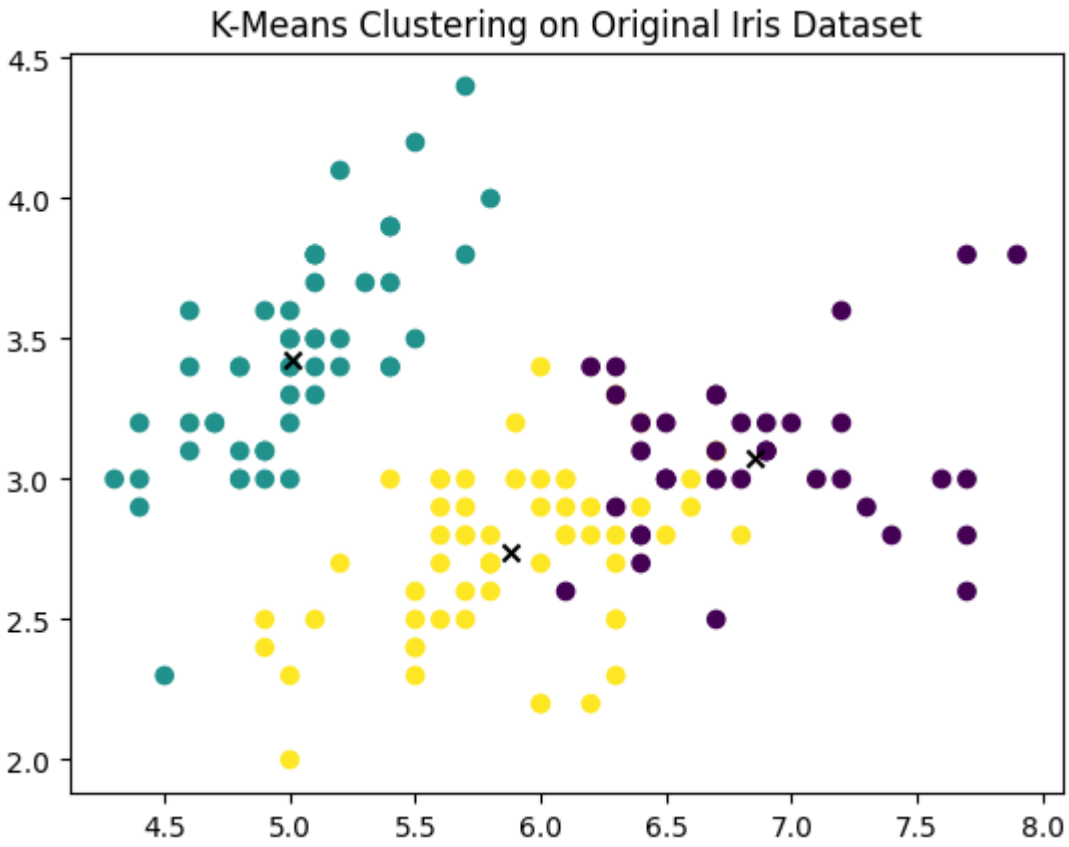
In [127…
```
model = KMeans(n_clusters=3, n_init=1, max_iter=100)
model.fit(x_reduced)

all_predictions = model.predict(x_reduced)
centroids = model.cluster_centers_
```

In [128…
```
centroids
```

Out[128]:
```
array([[ 2.34652659,  0.27393856],
       [-2.64241546,  0.19088505],
       [ 0.66567601, -0.3316042 ]])
```

In [141…
```
# Visualize the clustering results using a scatter plot
plt.scatter(x[:,0], x[:,1], c=all_predictions)
# Add the cluster centroids to the scatter plot
plt.scatter(centroids[:,0], centroids[:,1], marker='x', color="black")
plt.title('K-Means Clustering on Original Iris Dataset')
plt.show()
```



In [132…
```
plt.scatter(x_reduced[:,0], x_reduced[:,1], c=all_predictions)
plt.scatter(centroids[:,0], centroids[:,1], marker='x', color="black")
plt.title('K-Means Clustering on Iris Dataset Reduced with PCA')
plt.show()
```


K-Means Clustering on Iris Dataset Reduced with PCA
1.5
1.0
0.5
0.0
−0.5
−1.0
−3
−2
−1
0
1
2
3
4