In [2]:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.cluster import AgglomerativeClustering, KMeans
from sklearn.metrics import silhouette_score
# Load the data from the CSV file
data = pd.read_csv('Z:/College/3.2/ML LAB/Final lab/datasets/iris.csv')
# Drop any rows with missing values
data = data.dropna()
# Extract the features from the data
X = data.drop('Species', axis=1)
# Extract the labels from the data
y = data['Species']
# Set the number of clusters for k-means and hierarchical clustering
num_clusters = 3
# Perform hierarchical clustering using different linkage methods
methods = ['ward', 'complete', 'average']
for method in methods:
 # Create the AgglomerativeClustering object
 clustering = AgglomerativeClustering(n_clusters=num_clusters, linkage=method)

 # Fit the model to the data
 clustering.fit(X)

 # Calculate the Silhouette score for the clustering solution
 score = silhouette_score(X, clustering.labels_)

 # Plot the clusters
 plt.scatter(X.iloc[:, 0], X.iloc[:, 1], c=clustering.labels_, cmap='viridis')
 plt.title(f'Hierarchical Clustering ({method}), Silhouette Score: {score:.2f}')
 plt.show()
# Perform k-means clustering
# Load the data from the CSV file
data = pd.read_csv('Z:/College/3.2/ML LAB/Final lab/datasets/iris.csv')
# Drop any rows with missing values
data = data.dropna()
# Extract the features from the data
X = data.drop('Species', axis=1)
# Extract the labels from the data
y = data['Species']
# Set the number of clusters for k-means and hierarchical clustering
num_clusters = 3
# Perform hierarchical clustering using different linkage methods
methods = ['ward', 'complete', 'average']
kmeans = KMeans(n_clusters=num_clusters)
# Fit the model to the data
kmeans.fit(X)
# Calculate the Silhouette score for the clustering solution
score = silhouette_score(X, kmeans.labels_)
# Plot the clusters
plt.scatter(X.iloc[:, 0], X.iloc[:, 1], c=kmeans.labels_, cmap='viridis')
plt.title(f'K-Means Clustering, Silhouette Score: {score:.2f}')
plt.show()
ward_labels = AgglomerativeClustering(n_clusters=num_clusters, linkage='ward').fit_predic
ward_score = silhouette_score(X, ward_labels)
print(f'Hierarchical Clustering (Ward), Silhouette Score: {ward_score:.2f}')

# Hierarchical Clustering (Complete)
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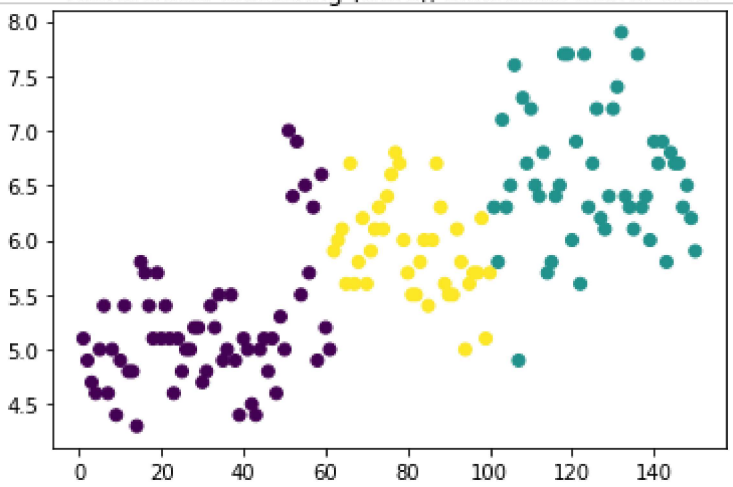
complete_labels = AgglomerativeClustering(n_clusters=num_clusters, linkage='complete').fi
complete_score = silhouette_score(X, complete_labels)
print(f'Hierarchical Clustering (Complete), Silhouette Score: {complete_score:.2f}')

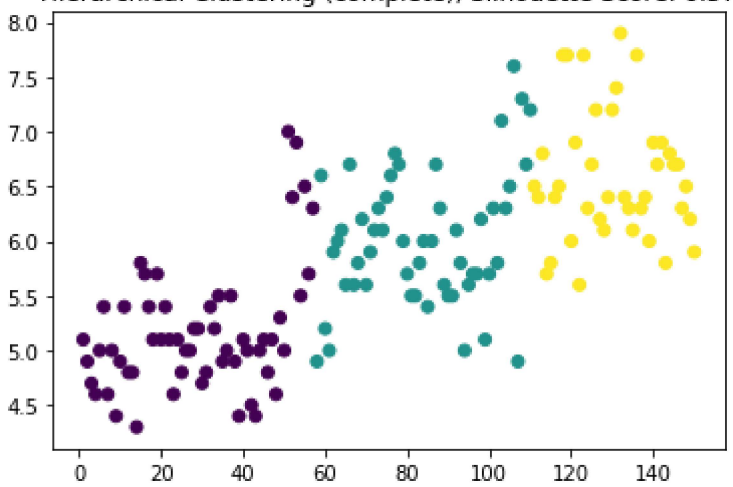
# Hierarchical Clustering (Average)
average_labels = AgglomerativeClustering(n_clusters=num_clusters, linkage='average').fit_
average_score = silhouette_score(X, average_labels)
print(f'Hierarchical Clustering (Average), Silhouette Score: {average_score:.2f}')

# K-Means Clustering
kmeans = KMeans(n_clusters=num_clusters)
kmeans_labels = kmeans.fit_predict(X)
kmeans_score = silhouette_score(X, kmeans_labels)
print(f'K-Means Clustering, Silhouette Score: {kmeans_score:.2f}')
```

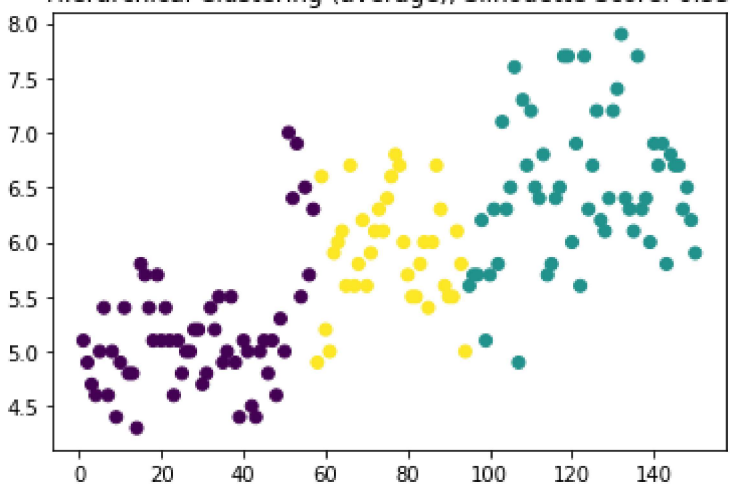
Hierarchical Clustering (ward), Silhouette Score: 0.55

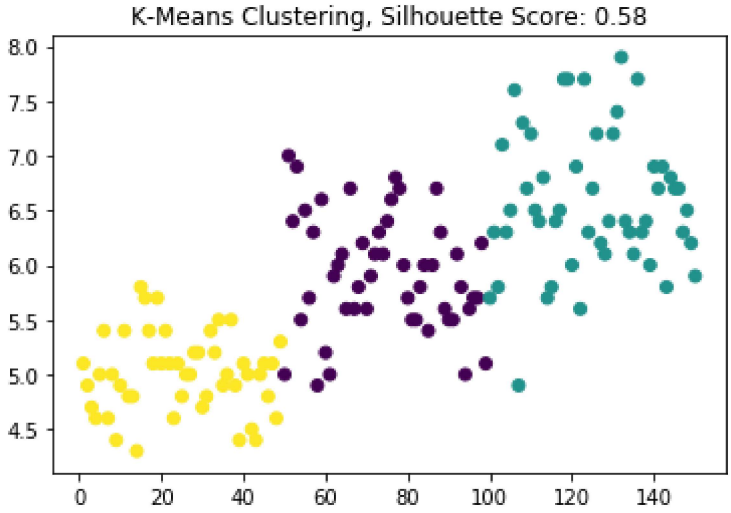


Hierarchical Clustering (complete), Silhouette Score: 0.57



Hierarchical Clustering (average), Silhouette Score: 0.55



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Hierarchical Clustering (Ward), Silhouette Score: 0.55
Hierarchical Clustering (Complete), Silhouette Score: 0.57
Hierarchical Clustering (Average), Silhouette Score: 0.55
K-Means Clustering, Silhouette Score: 0.58
```

In [ ]: