

Lab 7

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Different types of Clustering

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In [ ]: import numpy as np
import matplotlib.pyplot as plt
from sklearn.cluster import KMeans, AgglomerativeClustering, DBSCAN
from sklearn.mixture import GaussianMixture

# Generate sample data
np.random.seed(0)
X = np.random.rand(500, 2) * 10

# K-Means Clustering
kmeans = KMeans(n_clusters=4, random_state=0)
kmeans.fit(X)
labels_kmeans = kmeans.labels_

# Hierarchical (Agglomerative) Clustering
agg_clust = AgglomerativeClustering(n_clusters=4, linkage='ward')
labels_agg = agg_clust.fit_predict(X)

# DBSCAN Clustering
dbscan = DBSCAN(eps=4, min_samples=5)
labels_dbscan = dbscan.fit_predict(X)

# Gaussian Mixture Model (GMM) Clustering
gmm = GaussianMixture(n_components=4, random_state=0)
gmm.fit(X)
labels_gmm = gmm.predict(X)

# Plot the results
fig, axes = plt.subplots(2, 2, figsize=(12, 10))

axes[0, 0].scatter(X[:, 0], X[:, 1], c=labels_kmeans, cmap='viridis')
axes[0, 0].scatter(kmeans.cluster_centers_[0], kmeans.cluster_centers_[1], c='red')
axes[0, 0].set_title('K-Means Clustering')

axes[0, 1].scatter(X[:, 0], X[:, 1], c=labels_agg, cmap='viridis')
axes[0, 1].set_title('Hierarchical Clustering')

axes[1, 0].scatter(X[:, 0], X[:, 1], c=labels_dbscan, cmap='viridis')
axes[1, 0].set_title('DBSCAN Clustering')

axes[1, 1].scatter(X[:, 0], X[:, 1], c=labels_gmm, cmap='viridis')
axes[1, 1].set_title('Gaussian Mixture Model Clustering')
```

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plt.show()
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/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages/sklearn/cluster/_kmeans.py:1416: FutureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
```

```
super()._check_params_vs_input(X, default_n_init=10)
```

