AAI Experiment 3

Code:

import numpy as np

import matplotlib.pyplot as plt

from sklearn.mixture import GaussianMixture

np.random.seed(42)

data = np.vstack([

np.random.normal(0, 1, (100, 2)),

np.random.normal(5, 1, (100, 2)),

np.random.normal(10, 1, (100, 2))

])

gmm = GaussianMixture(n\_components=3, covariance\_type='full')

gmm.fit(data)

predictions = gmm.predict(data)

plt.scatter(data[:, 0], data[:, 1], c=predictions, cmap='viridis')

plt.title('Gaussian Mixture Model Clustering')

plt.xlabel('Feature 1')

plt.ylabel('Feature 2')

plt.show()

print("Gaussian Component Means:")

print(gmm.means\_)

sample\_point = [[1, 1]]

probabilities = gmm.predict\_proba(sample\_point)

print("\nProbability of Sample Point Belonging to Each Gaussian Component:")

print(probabilities)

Output:

Gaussian Component Means:

[[-0.11500025 0.03520814]

[ 9.93535563 9.86920694]

[ 5.12753905 5.02684078]]

Probability of Sample Point Belonging to Each Gaussian Component:

[[9.99999993e-01 4.74172909e-31 7.29577319e-09]]

