

Assignment 5: We have given a collection of 8 points.

P1=[0.1,0.6]

P2=[0.15,0.71]

P3=[0.08,0.9]

P4=[0.16, 0.85]

P5=[0.2,0.3]

P6=[0.25,0.5]

P7=[0.24,0.1]

P8=[0.3,0.2]

Perform the k-mean clustering with initial centroids as m1=P1 =Cluster#1=C1 and

m2=P8=cluster#2=C2.

Answer the following

1] Which cluster does P6 belong to?

2] What is the population of cluster around m2? 3] What is updated value of m1 and m2?

Input=>

```
import numpy as np

# Given points
points = np.array([
    [0.1, 0.6], [0.15, 0.71], [0.08, 0.9], [0.16, 0.85],
    [0.2, 0.3], [0.25, 0.5], [0.24, 0.1], [0.3, 0.2]
])

# Initial centroids
centroid1 = np.array([0.1, 0.6])
centroid2 = np.array([0.3, 0.2])

def euclidean_distance(a, b):
    return np.sqrt(np.sum((a - b)**2))

# Assign points to clusters
def assign_clusters(points, centroid1, centroid2):
    cluster1 = []
    cluster2 = []
    for point in points:
        d1 = euclidean_distance(point, centroid1)
```

```

        d2 = euclidean_distance(point, centroid2)
        if d1 < d2:
            cluster1.append(point)
        else:
            cluster2.append(point)
    return np.array(cluster1), np.array(cluster2)

# Perform one iteration
cluster1, cluster2 = assign_clusters(points, centroid1, centroid2)

# Calculate new centroids
centroid1_new = np.mean(cluster1, axis=0)
centroid2_new = np.mean(cluster2, axis=0)

print(f"Cluster1: {cluster1}")
print(f"Cluster2: {cluster2}")
print(f"Updated Centroid 1: {centroid1_new}")
print(f"Updated Centroid 2: {centroid2_new}")

# Determine the cluster for P6
p6 = np.array([0.25, 0.5])
d1_p6 = euclidean_distance(p6, centroid1_new)
d2_p6 = euclidean_distance(p6, centroid2_new)
p6_cluster = 'C1' if d1_p6 < d2_p6 else 'C2'
print(f"P6 belongs to: {p6_cluster}")

# Population around m2
print(f"Population around m2 (Cluster2): {len(cluster2)}")

```

Output =>

```

[Running] python -u "c:\Users\Shreyash
Musmade\Desktop\Practical\MIDS\MIDS_Prac-4\Practical.py"
Cluster1: [[0.1  0.6 ]
 [0.15 0.71]
 [0.08 0.9 ]
 [0.16 0.85]
 [0.25 0.5 ]]
Cluster2: [[0.2  0.3 ]
 [0.24 0.1 ]
 [0.3  0.2 ]]
Updated Centroid 1: [0.148 0.712]
Updated Centroid 2: [0.24666667 0.2      ]
P6 belongs to: C1
Population around m2 (Cluster2): 3
[Done] exited with code=0 in 1.943 seconds

```