ASSIGNMENT NO: 01

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Roll No: TYCOC218

Batch: C-4

Subject: DMW

Code:

```
import numpy as np
data={
   '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]
}
points = np.array(list(data.values()))
labels = list(data.keys())
C1 = np.array(data['P1'])
C2 = np.array(data['P8'])
def distance(p1, p2):
   return np.sqrt(np.sum((p1 - p2) ** 2))
def k_means_step(points, C1, C2):
   cluster_1 = []
   cluster_2 = []
   for point in points:
      dist_to_C1 = distance(point, C1)
      dist_to_C2 =distance(point, C2)
   if dist_to_C1 < dist_to_C2:
         cluster_1.append(point)
   else:
```

```
            cluster_2.append(point)
    cluster_1 = np.array(cluster_1)
    cluster_2 = np.array(cluster_2)
    new_C1 = cluster_1.mean(axis=0) if len(cluster_1) > 0 else C1
    new_C2 = cluster_2.mean(axis=0) if len(cluster_2) > 0 else C2
    return new_C1, new_C2, cluster_1, cluster_2
new_C1, new_C2, cluster_1, cluster_2 = k_means_step(points, C1, C2)
P6 = np.array(data['P6'])
dist_to_new_C1 =  distance(P6, new_C1)
dist_to_new_C2 =  distance(P6, new_C2)
print("1. Which cluster does P6 belong to?")
if dist_to_new_C1 < dist_to_new_C2:
    print("P6 belongs to Cluster 1")
else:
    print("P6 belongs to Cluster 2")
print("2. What is the population of cluster around C2?")
print("Cluster 1 population:", len(cluster_1))
print("Cluster 2 population:", len(cluster_2))
print("3. What is the updated value of C1 and C2?")
print("Updated C1:", new_C1)
print("Updated C2:", new_C2)
```

Output:

1. Which cluster does P6 belong to?

P6 belongs to Cluster 1

2. What is the population of cluster around C2?

Cluster 1 population: 0

Cluster 2 population: 1

3. What is the updated value of C1 and C2?

Updated C1: [0.1 0.6]

Updated C2: [0.3 0.2]