#### **K-means Clustering**

# **Example**

Cluster the following eight points (with (x, y) representing locations) into three clusters:

A1(2, 10), A2(2, 5), A3(8, 4), A4(5, 8), A5(7, 5), A6(6, 4), A7(1, 2), A8(4, 9)

### **Solution**

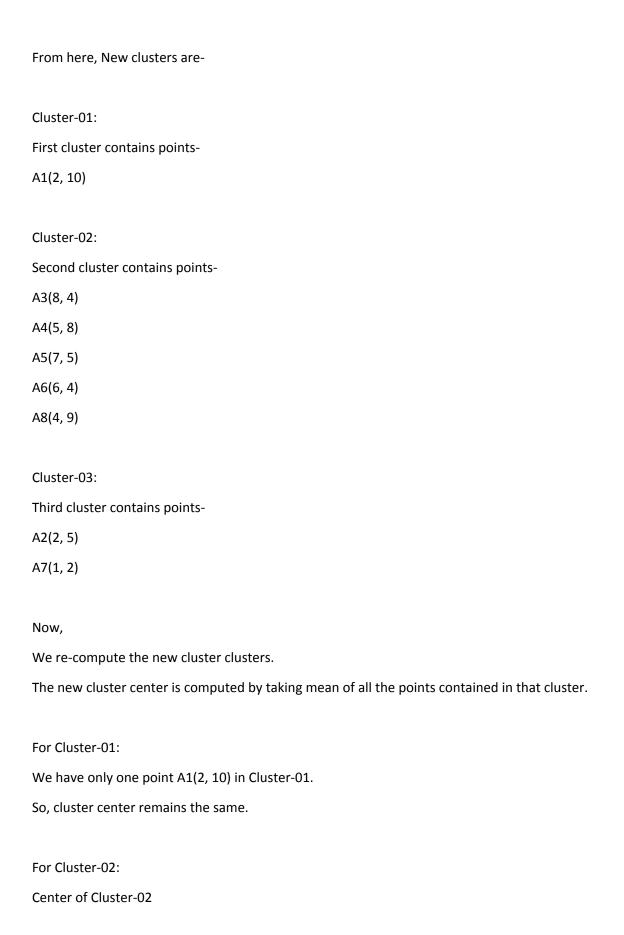
Initial cluster centers are: A1(2, 10), A4(5, 8) and A7(1, 2).

## **Iteration-01:**

We calculate the distance of each point from each of the center of the three clusters.

The distance is calculated by using the Euclidean distance formula.

Given Points	Distance from center (2, 10) of Cluster-01	Distance from center (5, 8) of Cluster-02	Distance from center (1, 2) of Cluster-03	Point belongs to Cluster
A1(2, 10)	0	5	9	C1
A2(2, 5)	5	6	4	C3
A3(8, 4)	12	7	9	C2
A4(5, 8)	5	0	10	C2
A5(7, 5)	10	5	9	C2
A6(6, 4)	10	5	7	C2
A7(1, 2)	9	10	0	C3
A8(4, 9)	3	2	10	C2



For Cluster-03:

Center of Cluster-03

$$=((2+1)/2, (5+2)/2)$$

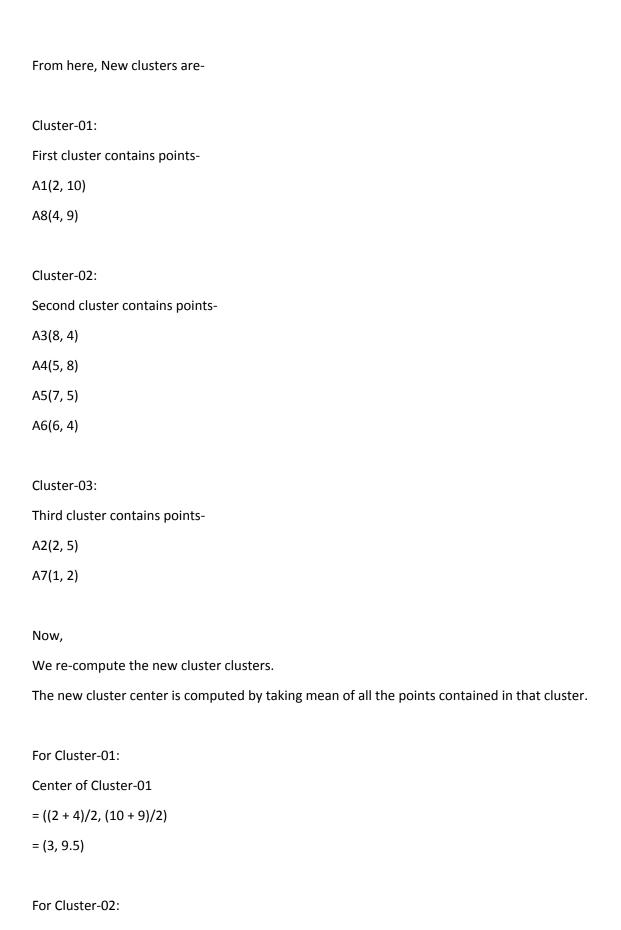
This is completion of Iteration-01.

### **Iteration-02:**

We calculate the distance of each point from each of the center of the three clusters.

The distance is calculated by using the given distance function.

Given Points	Distance from center (2, 10) of Cluster-01	Distance from center (6, 6) of Cluster-02	Distance from center (1.5, 3.5) of Cluster-03	Point belongs to Cluster
A1(2, 10)	0	8	7	C1
A2(2, 5)	5	5	2	C3
A3(8, 4)	12	4	7	C2
A4(5, 8)	5	3	8	C2
A5(7, 5)	10	2	7	C2
A6(6, 4)	10	2	5	C2
A7(1, 2)	9	9	2	C3
A8(4, 9)	3	5	8	C1



### Center of Cluster-02

$$=((8+5+7+6)/4, (4+8+5+4)/4)$$

### For Cluster-03:

Center of Cluster-03

$$=((2+1)/2, (5+2)/2)$$

This is completion of Iteration-02.

After second iteration, the center of the three clusters are-

C1(3, 9.5)

C2(6.5, 5.25)

C3(1.5, 3.5)