

## Follow only the below given method for K-Means clustering

### K- Means Clustering

**Q. Apply K(=2)-Means algorithm over the data (185, 72), (170, 56), (168, 60), (179,68), (182,72), (188,77) up to two iterations and show the clusters. Initially choose first two objects as initial centroids.**

#### ***Solution:***

Given, number of clusters to be created (K) = 2 say c1 and c2,  
number of iterations = 2 and

The given data points can be represented in tabular form as:

Instance	X	Y
1	185	72
2	170	56
3	168	60
4	179	68
5	182	72
6	188	77

Data Points

Consider, first two objects as initial centroids:

Centroid for first cluster  $c_1 = (185, 72)$

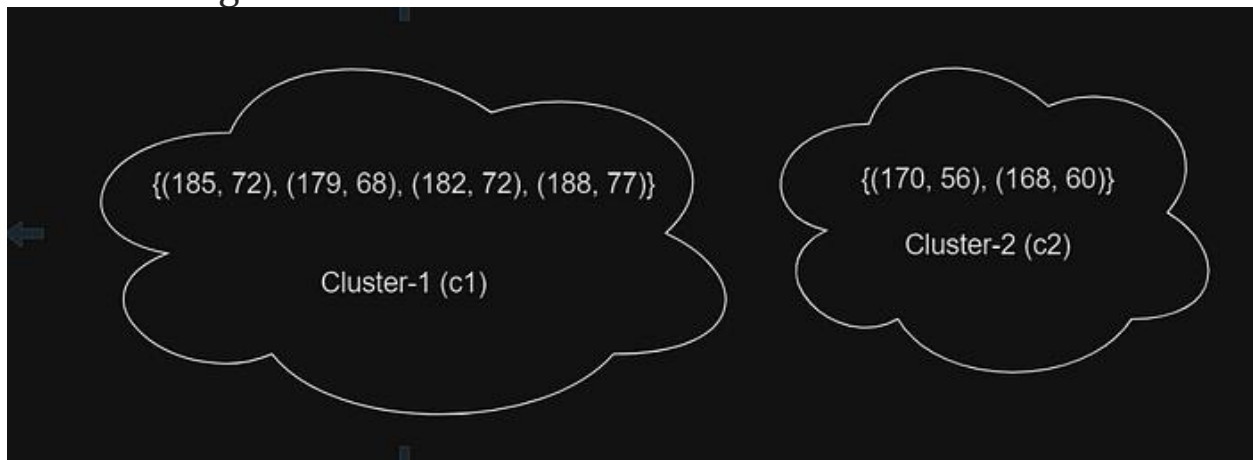
Centroid for second cluster  $c_2 = (170, 56)$

**Iteration 1:** Now calculating similarity by using **Euclidean distance** measure as:

Instance	X	Y	Distance(C1) (185,72)	Distance(C2) (170,56)	Cluster
1	185	72	0	21.93	C1
2	170	56	21.93	0	C2
3	168	60	20.8	4.47	C2
4	179	68	7.21	15	C1
5	182	72	3	20	C1
6	188	77	5.83	27.66	C1

Distance of each data points from cluster centroids

The resulting cluster after first iteration is:



Data points cluster

**Iteration 2:** Now calculating **new centroid** for each cluster:

$$\text{Centroid for first cluster } c1 = \left( \frac{185+179+182+188}{4}, \frac{72+68+72+77}{4} \right) = (183.5, 72.25)$$

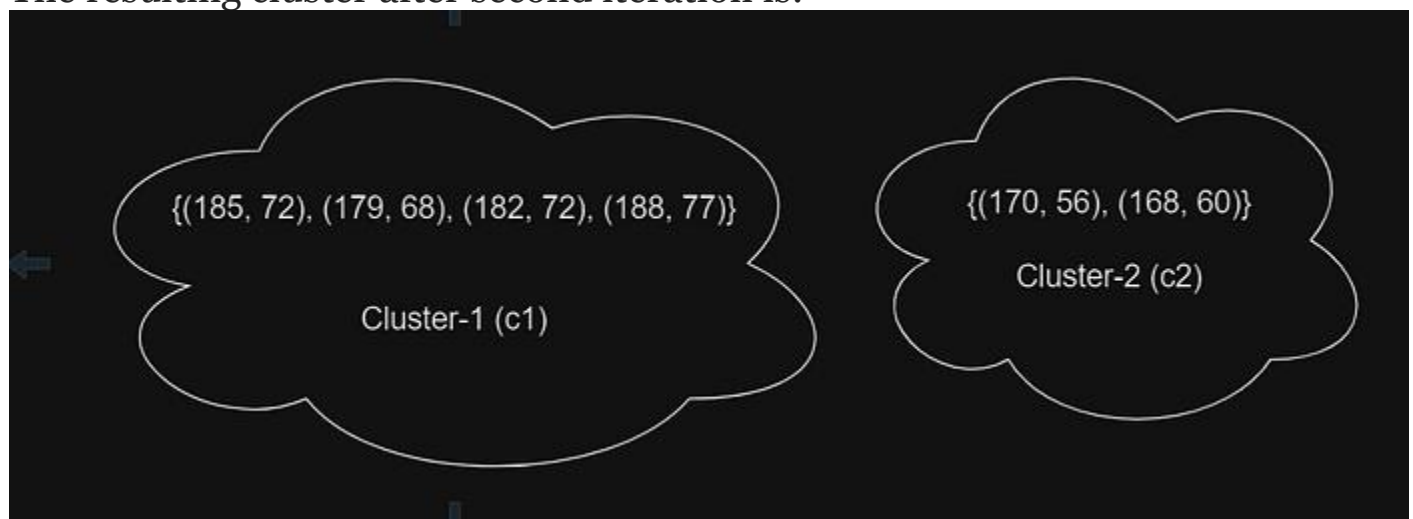
$$\text{Centroid for second cluster } c2 = \left( \frac{170+168}{2}, \frac{56+60}{2} \right) = (169, 58)$$

Now, again calculating similarity using *Euclidean distance* from new centroids. **C1(183.5,72.25) and C2(169,58)**

Instance	X	Y	Distance from C1(183.5,72.25)	Distance from C2(169,58)	Cluster
1	185	72	2.31	21.26	<b>C1</b>
2	170	56	21.13	2.23	<b>C2</b>
3	168	60	19.75	2.23	<b>C2</b>
4	179	68	6.12	14.14	<b>C1</b>
5	182	72	1.52	19.1	<b>C1</b>
6	188	77	6.54	26.87	<b>C1</b>

Distance of each data points from cluster centroids

The resulting cluster after second iteration is:



Data points cluster

- As we have already completed two iterations as asked by our question, the numerical ends here.
- **Since, the clustering doesn't change after second iteration, so terminate the iteration.**