

## CMPE - 256 Assignment

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⇒ AIM ⇒ k-means cluster

Shopper	Spending Index	Income Index
4	2	6
2	3	4
1	3	5
5	4	5
3	5	6
9	5	6
7	6	2
8	6	3
10	6	7
6	6	8
11	7	2
14	8	2
17	8	3
12	8	5
13	9	1
16	9	1
15	9	6

⇒ cluster = 2

⇒ taking Point (2,6) & (9,5) as the Centroids of cluster 1 (C1) & cluster 2 (C2).

⇒ Cluster (c<sub>1</sub>)                      Cluster (c<sub>2</sub>)  
           (2, 5)                                      (9, 5)

⇒ Taking point P<sub>2</sub> (3, 4)

$$\begin{aligned} \text{Distance from } \phi_1 &= \sqrt{(3-2)^2 + (4-5)^2} \\ \text{Cluster 1} &= 2.23 \end{aligned}$$

$$\begin{aligned} \text{Distance from } \phi_2 &= \sqrt{(3-9)^2 + (4-5)^2} \\ \text{Cluster 2} &= \sqrt{40} \end{aligned}$$

⇒  $\phi_1$  is less, Point (3, 4) will be in Cluster 1.

Centroid                      Cluster 1 (c<sub>1</sub>)                      Cluster 2 (c<sub>2</sub>)  
   (4.5, 5)                                      (9, 6)

⇒ For Point (3, 5)

$$\phi_1 = \sqrt{(3-4.5)^2 + (5-5)^2} = 0.25$$

$$\phi_2 = \sqrt{(3-9)^2 + (5-6)^2} = \sqrt{37}$$

⇒  $\phi_1$  is less, (3, 5) will be in Cluster 1.



Cluster 1 (c1)  
Centroid (2.75, 5)

Cluster 2 (c2)  
(9, 6)

⇒ Point (4, 5)

$$D_1 = \sqrt{(2.75 - 4)^2 + (5 - 5)^2} = 1.25$$

$$D_2 = \sqrt{(9 - 4)^2 + (6 - 5)^2} = \sqrt{26}$$

⇒  $D_1$  is less, (4, 5) will be in cluster 1.

Cluster 1 (c1)  
Centroid (3.4, 5)

Cluster 2 (c2)  
(9, 6)

⇒ Point (5, 6)

$$D_1 = \sqrt{(5 - 3.4)^2 + (6 - 5)^2} = 1.87$$

$$D_2 = \sqrt{(9 - 5)^2 + (6 - 6)^2} = 4$$

⇒  $D_1$  is less, (5, 6) will be in cluster 1.

Cluster 1  
Centroid (4.2, 5.5)

Cluster 2  
(9, 6)

⇒ Point (5, 6)

$$D_1 = \sqrt{(5-4.2)^2 + (6-5.5)^2} = 0.54$$

$$D_2 = \sqrt{(5-9)^2 + (6-9)^2} = 4$$

⇒  $D_1$  is less, (5, 6) will be in Cluster 1.

Cluster 1 (c1)

(4.6, 5.8)

Cluster (c2)

(3, 6)

⇒ Point (6, 2)

$$D_1 = \sqrt{(6-4.6)^2 + (2-5.8)^2} = 4.084$$

$$D_2 = \sqrt{(6-9)^2 + (2-9)^2} = 5$$

⇒  $D_1$  is less, (6, 2) will be in Cluster 1.

Cluster 1

(5.3, 3.9)

Cluster 2

(9, 6)

⇒ Point (6, 3)

$$D_1 = \sqrt{(6-5.3)^2 + (3-3.9)^2} = 1.14$$

$$D_2 = \sqrt{(6-9)^2 + (3-6)^2} = 4.2$$



⇒  $D_1$  is less,  $(6, 3)$  will be in cluster 1

Cluster 1  
(5.6, 3.4)

Cluster 2  
(9, 6)

⇒ Point  $(6, 3)$

$$D_1 = \sqrt{(6-5.6)^2 + (3-3.4)^2} = 3.6$$

$$D_2 = \sqrt{(9-6)^2 + (6-3)^2} = 3.1$$

⇒  $D_2$  is less,  $(6, 3)$  will be in Cluster 2

Cluster 1  
(5.6, 3.4)

Cluster 2  
(7.5, 8)

⇒ Point  $(6, 8)$

$$D_1 = \sqrt{(6-5.6)^2 + (8-3.4)^2} = 4.62$$

$$D_2 = \sqrt{(7.5-6)^2 + (8-8)^2} = 1.5$$

⇒  $D_2$  is less,  $(6, 8)$  will be in cluster 2

Cluster 1  
(5.6, 3.4)

Cluster 2  
(6.5, 8)

→ Point (7, 2)

$$D_1 = \sqrt{(7-5.6)^2 + (3.4-2)^2} = 1.97$$

$$D_2 = \sqrt{(7-6.8)^2 + (8-2)^2} = 6.01$$

⇒  $D_1$  is less, (7, 2) will be in Cluster 1.

Cluster 1

(5.6, 3.4)

Cluster 2

(6.8, 8)

⇒ Point (8, 2)

$$D_1 = \sqrt{(8-6.3)^2 + (2.9-2)^2} = 1.84$$

$$D_2 = \sqrt{(8-6.8)^2 + (8-2)^2} = 6.12$$

⇒  $D_1$  is less, (8, 2) will be in cluster 1.

Cluster 1

(7.2, 2.4)

Cluster 2

(6.8, 8)

⇒ Point (8, 3)

$$D_1 = \sqrt{(8-7.2)^2 + (3-2.4)^2} = 1$$

$$D_2 = \sqrt{(8-6.8)^2 + (8-3)^2} = 5.14$$



⇒  $D_1$  is less, (8,3) will be in cluster 1.

Cluster 1	Cluster 2
(7.6, 2.7)	(6.8, 8)

⇒ Point (8,5)

$$D_1 = \sqrt{(8-7.6)^2 + (5-2.7)^2} = 2.33$$

$$D_2 = \sqrt{(8-6.8)^2 + (5-8)^2} = 3.23$$

⇒  $D_1$  is less, (8,5) will be in cluster 1.

Cluster 1	Cluster 2
(7.6, 3.8)	(6.8, 8)

⇒ Point (9,1)

$$D_1 = \sqrt{(9-7.6)^2 + (3.8-1)^2} = 3.04$$

$$D_2 = \sqrt{(9-6.8)^2 + (8-1)^2} = 7.35$$

→  $D_1$  is less, (9,1) will be in cluster 1.

Cluster 1	Cluster 2
(8.4, 2.4)	(6.8, 8)

⇒ Point (9,1)

$$D_1 = \sqrt{(9-8.4)^2 + (2.4-1)^2} = 1.52$$

$$D_2 = \sqrt{(9-6.1)^2 + (8-1)^2} = 7.34$$

→  $D_1$  is less, (9,1) will be in cluster 1.

⇒ 5 Shopper Points

Cluster 1	Cluster 2
(2,6), (3,4), (3,5), (4,5), (5,6), (5,6), (6,2), (6,3), (7,2), (8,2), (8,3), (8,5), (9,1), (9,1)	(9,6), (6,10), (6,8), (6,2), (6,5)

⇒ Shopper Number

Cluster 1	Cluster 2
1, 2, 3, 4, 5, 7, 8, 9, 11, 12, 13, 14, 16, 17	6, 10, 15