CMPE 256 Assignment

Starbucks Assignment

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Points	Co-ordinates	Points	Co-ordinates
P_0	(1,5)	P_{10}	(4,8)
P_1	(1,7)	P_{11}	(4,8)
P_2	(2,6)	P_{12}	(5,4)
P_3	(2,9)	P_{13}	(5,7)
P_4	(3,3)	P_{14}	(6,9)
P_5	(3,6)	P_{15}	(7,2)
P_6	(3,8)	P_{16}	(7,3)
P_7	(3,8)	P_{17}	(7,9)
P_8	(3,9)	P_{18}	(8,1)
P_9	(4,5)	P_{19}	(8,7)

⇒ We will form 3 clusters with Points P_0, P_8, P_{16}. in all the 3 clusters

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	Cluster 1 (C_1)	Cluster 2 (C_2)	Cluster (C_3)
Centroid	(1,5)	(3,9)	(8,1)

⇒ Let's take a point P_1 (1,7)

Distance from C_1 = $\sqrt{(1-1)^2+(5-7)^2}$ = 2 = D_1

Distance from C_2 = $\sqrt{(3-1)^2+(9-7)^2}$ = $\sqrt{4+4}$ = $\sqrt{8}$ = D_2

Distance from C_3 = $\sqrt{(8-1)^2+(1-7)^2}$ = $\sqrt{85}$ = D_3

⇒ D_1 is less, Point P_1 will be in cluster C_1

	C1	C2	C3
Centroid	(1, 6)	$(\frac{3}{4}, \frac{9}{4})$	(8, 1)

⇒ Lets' take point P2 (2, 6)

⇒ Distance D1 = $\sqrt{(2-1)^2 + 0^2}$ = 1

Distance D2 = $\sqrt{(4-3)^2 + (6-9)^2}$ = $\sqrt{5}$

Distance D3 = $\sqrt{(8-2)^2 + (1-6)^2}$ = $\sqrt{34}$

⇒ Distance D2 = $\sqrt{(3-2)^2 + (9-6)^2}$ = $\sqrt{10}$

Distance D1 = $\sqrt{(2-1)^2 + (6-6)^2}$ = 1

Distance D3 = $\sqrt{(8-2)^2 + (6-1)^2}$ = $\sqrt{61}$

⇒ D1 is less, P2 will be in cluster C1.

	C1	C2	C3
Centroid	(1.5, 6)	$(\frac{3}{4}, \frac{9}{4})$	(8, 1)

⇒ Point P3 (2, 9)

D1 = $\sqrt{(2-1.5)^2 + (9-6)^2}$ = $\sqrt{9.5}$ = 3.04

D2 = $\sqrt{(3-2)^2 + (9-9)^2}$ = 1

D3 = $\sqrt{(8-2)^2 + (9-1)^2}$ = 10

⇒ D2 is less, P3 will be in cluster C2.

C1	C2	C3
(1.5, 6)	(2.5, 9)	(8, 1)

⇒ Point P4 (3, 3)

$D1 = \sqrt{(3-1.5)^2 + (6-3)^2} = \sqrt{11.25}$

$D2 = \sqrt{(3-2.5)^2 + (9-3)^2} = \sqrt{36.25}$

$D3 = \sqrt{(8-3)^2 + (3-1)^2} = \sqrt{29}$

⇒ D1 is less, P4 will be in cluster C1.

C1	C2	C3
(2.2, 4.5)	(2.5, 9)	(8, 1)

⇒ Point P5 (3, 6)

$D1 = \sqrt{(3-2.2)^2 + (6-4.5)^2} = \sqrt{2.89}$

$D2 = \sqrt{(3-2.5)^2 + (9-6)^2} = \sqrt{9.25}$

$D3 = \sqrt{(8-3)^2 + (6-1)^2} = \sqrt{50}$

⇒ D1 is less, P5 will be in cluster C1

C1	C2	C3
(2.6, 5.2)	(2.5, 9)	(8, 1)

⇒ Point P6 (3, 8)

D1 = $\sqrt{(3-2.6)^2 + (8-5.2)^2}$ = $\sqrt{8}$

D2 = $\sqrt{(3-2.7)^2 + (8-8)^2}$ = $\sqrt{10.25}$

D3 = $\sqrt{(8-3)^2 + (1-8)^2}$ = $\sqrt{74}$

⇒ D2 is less, P6 will be included in cluster C2

C1	C2	C3
(2.6, 5.2)	(2.7, 8.5)	(8, 1)

⇒ Point P7 (3, 8)

D1 = $\sqrt{(2.6-3)^2 + (8-5.2)^2}$ = $\sqrt{8}$

D2 = $\sqrt{(3-2.7)^2 + (8-8.5)^2}$ = $\sqrt{0.34}$

D3 = $\sqrt{(8-3)^2 + (1-8)^2}$ = $\sqrt{74}$

⇒ D2 is less, P7 will be in cluster C2

C1	C2	C3
(2.6, 5.2)	(2.8, 8.2)	(8, 1)

⇒ Point P9 (4, 5)

D1 = $\sqrt{(4-2.6)^2 + (5-5.2)^2}$

D2 = $\sqrt{(4-2.8)^2 + (8.2-5)^2}$

D3 = $\sqrt{(8-4)^2 + (5-1)^2}$ =

→ D1 is less, Point P9 will be in Cluster C1.

C1	C2	C3
(3.3, 5.1)	(2.8, 8.2)	(8, 1)

⇒ Point P_{10} (4, 8)

$D_1 = \sqrt{(4-3.3)^2+(8-5.1)^2} = \sqrt{8.9}$

$D_2 = \sqrt{(4-2.8)^2+(8.2-8)^2} = \sqrt{1.48}$

$D_3 = \sqrt{(8-4)^2+(8-1)^2} = \sqrt{65}$

→ D2 is less, P_{10} will be in cluster C2

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C1	C2	C3
(3.3, 5.1)	(3.4, 8.1)	(8, 1)

⇒ Point P_{11} (4, 8)

→ $D_1 = \sqrt{(4-3.3)^2+(8-5.1)^2} = \sqrt{8.9}$

$D_2 = \sqrt{(4-3.4)^2+(8-8.1)^2} = \sqrt{0.37}$

$D_3 = \sqrt{(8-4)^2+(1-8)^2} = \sqrt{65}$

→ D2 is less, P_{11} will be in cluster C2

⇒ C1 C2 C3

(3.3, 5.1) (3.7, 8) (8, 1)

⇒ Point P_{12} (5, 4)

$D_1 = \sqrt{(5-3.3)^2 + (5.1-4)^2}$

$D_2 = \sqrt{(5-3.7)^2 + (8-4)^2}$

$D_3 = \sqrt{(8-5)^2 + (1-4)^2}$

⇒ D_1 is less, P_{12} will be in cluster C1.

⇒ C1 C2 C3

(4.1, 4.5) (3.7, 8) (8, 1)

⇒ Point P_{13} (5, 7)

$D_1 = \sqrt{(5-4.1)^2 + (4.5-7)^2} = \sqrt{7.46}$

$D_2 = \sqrt{(5-3.7)^2 + (8-7)^2} = \sqrt{2.69}$

$D_3 = \sqrt{(8-5)^2 + (1-7)^2} = \sqrt{45}$

⇒ D2 is less, P_{13} will be in cluster C2

C1 C2 C3

(4.1, 4.5) (4.4, 7.5) (8, 1)

⇒ Point $P_{14}(6, 9)$

⇒ $D_1 = \sqrt{(6-4.1)^2 + (9-4.5)^2}$

$D_2 = \sqrt{(6-4.4)^2 + (9-7.5)^2}$

$D_3 = \sqrt{(8-7)^2 + (9-1)^2}$

⇒ D_2 is less, P_{14} will be in cluster 2

C1	C2	C3
(4.1, 4.5)	(5.2, 8.2)	(7.5, 1.5)

⇒ Point $P_{15}(7, 2)$

⇒ $D_1 = \sqrt{(7-4.1)^2 + (4.5-2)^2}$

$D_2 = \sqrt{(7.5-2)^2 + (8.2-2)^2}$

$D_3 = \sqrt{(7-8)^2 + (1-2)^2}$

⇒ D_3 is less, P_{15} will be in cluster C3.

C1	C2	C3
(4.1, 4.5)	(5.2, 8.2)	(7.5, 1.5)

⇒ Point $P_{15}(7, 3)$

$D1 = \sqrt{(7-4.1)^2 + (3-4.5)^2}$

$D2 = \sqrt{(7-5.2)^2 + (3-8.2)^2}$

$D3 = \sqrt{(7-7.2)^2 + (3-1.5)^2}$

⇒ D3 is less, P_{16} will be in cluster 3

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C1	C2	C3
(4.1, 4.5)	(5.2, 8.2)	(7.2, 2.2)

⇒ Point P_{17} (7, 9)

$D1 = \sqrt{(7-4.1)^2 + (9-4.5)^2}$

$D2 = \sqrt{(7-5.2)^2 + (9-8.2)^2}$

$D3 = \sqrt{(7.2-7)^2 + (2.2-9)^2}$

⇒ D2 is less, P_{17} will be in cluster C2

C1	C2	C3
(4.1, 4.5)	(6.1, 8.5)	(7.2, 2.2)

⇒ $P_{19}(8, 7)$

$D1 = \sqrt{(8-4.1)^2 + (7-4.5)^2}$

$D2 = \sqrt{(8-6)^2 + (8.5-7)^2}$

$D3 = \sqrt{(8-7.2)^2 + (2.2-7)^2}$

⇒ D2 is less. P_{19} will be in cluster C2

C1	C2	C3
(4.1, 4.5)	(7, 7.5)	(7.2, 2.2)

⇒ Cluster C1 ⇒ { P_0, P_1, P_2, P_4, P_5, P_9, P_{12} }

⇒ Cluster C2 ⇒ { P_3, P_6, P_7, P_8, P_{10}, P_{11}, P_{13}, P_{14}, P_{17}, P_{19} }

→ Cluster C3 = { P_{15}, P_{16}, P_{18} }