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Subject: Applied Machine Learning

Solution: Given we have

eight points,

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

Our Initial Centroids are,

A1 (2,10) ⬅
A4 (5,8) ⬅
A7 (1,2) ⬅

$x_1$   $y_1$   $x_2$   $y_2$

| Data Points | | | Distance to 2, 10 | 5, 8 | 1, 2 | Cluster | New Cluster |
|---|---|---|---|---|---|---|---|
| A1 | 2 | 10 | 0 | 5 | 9 | 1 | |
| A2 | 2 | 5 | 5 | 6 | 4 | 3 | |
| A3 | 8 | 4 | 12 | 4 | 9 | 2 | |
| A4 | 5 | 8 | 5 | 0 | 10 | 2 | |
| A5 | 7 | 5 | 10 | 3 | 9 | 2 | |
| A6 | 6 | 4 | 10 | 5 | 7 | 2 | |
| A7 | 1 | 2 | 9 | 10 | 0 | 3 | |
| A8 | 4 | 9 | 3 | 2 | 10 | 2 | |

$\Rightarrow$ New Centroids: $\Leftarrow$

A1 : (2, 10) $\longrightarrow$ B/c 1-value belong to it

A4 : (6, 6) $\longrightarrow$

A7 : (1.5, 3.5)

| Data Points | | | Distance to 2, 10 | 5, 0 | 1.5, 1.5 | Cluster | New Cluster |
|---|---|---|---|---|---|---|---|
| A1 | 2 | 6 | 10 | 8 | 9 | 1 | 2 |
| A2 | 2 | 5 | 5 | 5 | 4 | 3 | 3 |
| A3 | 8 | 4 | 12 | 4 | 9 | 2 | 2 |
| A4 | 5 | 8 | 5 | 3 | 10 | 2 | 2 |
| A5 | 7 | 5 | 10 | 2 | 9 | 2 | 2 |
| A6 | 6 | 4 | 10 | 2 | 7 | 2 | 2 |
| A7 | 1 | 2 | 9 | 9 | 0 | 3 | 3 |
| A8 | 4 | 9 | 3 | 5 | 10 | 2 | 1 |