|  |  |  |  |
| --- | --- | --- | --- |
| **Sample Data** | **X** | **Y** | **Kelompok / Cluster** |
| 1 | 30 | 100 |  |
| 2 | 90 | 10 |  |
| 3 | 60 | 40 |  |
| 4 | 40 | 70 |  |
| 5 | 20 | 48 |  |

Kita akan mengaplikasikan K-Means Clustering untuk data diatas menjadi 2 cluster. Pertama kita akan hitung Centroid.

|  |  |  |
| --- | --- | --- |
| **Cluster** | **X** | **Y** |
| K1 | 30 | 100 |
| K2 | 90 | 10 |

Perhitungan menggunakan persamaan Euclidean Distance

Perhitungan Pertama ;

Cluster 1 (90, 10) =

( jarak cluster 1 ke cluster 1)

Jarak dari Cluster 2 ke cluster 1 (90 , 10) ↔ (30,100) =

Jarak dari cluster 1 ke cluster 2 (30, 100) ↔ (90, 10) =

Jarak cluster 2 ke cluster 2 (40, 60) =

Sehingga ;

|  |  |  |  |
| --- | --- | --- | --- |
| **Cluster** | **Centroid** | | **Kelompok Cluster** |
| **X** | **Y** |
| K1 (30, 100) | 0 | 108,17 | **1** |
| K2 (90, 10) | 108,17 | 0 | **2** |

Perhitungan kedua.

Langkah selanjutnya kita beralih ke data ketiga yaitu (60, 40). Kita mulai menghitung jarak dataset terhadap cluster 1.

(30, 100) ↔ (60, 40) =

Kemudian kita hitung jarak dataset terhadap cluster 2.

(90, 10) ↔ (60, 40) =

Sehingga didapatkan :

|  |  |  |  |
| --- | --- | --- | --- |
| **Dataset** | **Euclidean Distance** | | **Kelompok Cluster** |
| **Cluster 1** | **Cluster 2** |
| (60 , 40) | 67,08 | 42,43 | **2** |

Dataset ke-3 masuk dalam kelompok cluster 2 , karena jarak minimum / terdekat dataset adalah terhadap cluster 2 yaitu 42,43.

Kemudian kita update Centroid

|  |  |  |
| --- | --- | --- |
| **Cluster** | **X** | **Y** |
| K1 | 30 | 100 |
| K2 |  |  |

Jadi Cluster Centroid yang baru adalah sebagai berikut :

|  |  |  |
| --- | --- | --- |
| **Cluster** | **X** | **Y** |
| K1 | 30 | 100 |
| K2 | 75 | 25 |

Perhitungan ketiga

Kita lanjutkan kembali menghitung dataset ke-4 yaitu (40, 70). Kita mulai menghitung jarak dataset terhadap cluster 1.

(30, 100) ↔ (40, 70) =

Kemudian kita hitung jarak dataset terhadap cluster 2 yaitu (75, 25).

(75, 25) ↔ (40, 70) =

Sehingga didapatkan :

|  |  |  |  |
| --- | --- | --- | --- |
| **Dataset** | **Euclidean Distance** | | **Kelompok Cluster** |
| **Cluster 1** | **Cluster 2** |
| (40 , 70) | 31,62 | 57,01 | 1 |

Dataset ke-4 masuk dalam kelompok cluster 1 , karena jarak minimum / terdekat dataset adalah terhadap cluster 1 yaitu 31,62.

Kemudian kita update Centroid

|  |  |  |
| --- | --- | --- |
| **Cluster** | **X** | **Y** |
| K1 |  |  |
| K2 | 75 | 25 |

Jadi Cluster Centroid yang baru adalah sebagai berikut :

|  |  |  |
| --- | --- | --- |
| **Cluster** | **X** | **Y** |
| K1 | 35 | 85 |
| K2 | 75 | 25 |

Perhitungan keempat

Kita lanjutkan kembali menghitung dataset ke-5 yaitu (20, 48). Kita mulai menghitung jarak dataset terhadap cluster 1. Perhatikan kembali, centroid 1 yang digunakan adalah yang telah terupdate yaitu (35, 85).

(35, 85) ↔ (20, 48) =

Kemudian kita hitung jarak dataset terhadap cluster 2.

(75, 25) ↔ (20, 48) =

Sehingga didapatkan :

|  |  |  |  |
| --- | --- | --- | --- |
| **Dataset** | **Euclidean Distance** | | **Kelompok Cluster** |
| **Cluster 1** | **Cluster 2** |
| (20, 48) | 39,92 | 59,62 | 1 |

Dataset ke-4 masuk dalam kelompok cluster 1 , karena jarak minimum / terdekat dataset adalah terhadap cluster 1 yaitu 39,92

Kemudian kita update Centroid

|  |  |  |
| --- | --- | --- |
| **Cluster** | **X** | **Y** |
| K1 |  |  |
| K2 | 75 | 25 |

Jadi Cluster Centroid yang baru adalah sebagai berikut :

|  |  |  |
| --- | --- | --- |
| **Cluster** | **X** | **Y** |
| K1 | 27,5 | 66,5 |
| K2 | 75 | 25 |

Dari kelima perhitungan perwakilan data diatas dapat disimpulkan bahwa ketika inputan x<y maka akan masuk pada klister 1 begitupun sebalikya jika inputan y<x maka akan masuk cluster 2 jika x=y maka akan masuk cluster yang centroidnya lebih randah. Dengan adanya kesimpulan tersebut kita dapat mengisi seluruh data yang ada

|  |  |  |  |
| --- | --- | --- | --- |
| **Sample Data** | **X** | **Y** | **Kelompok / Cluster** |
| 1 | 30 | 100 | 1 |
| 2 | 90 | 10 | 2 |
| 3 | 60 | 40 | 2 |
| 4 | 40 | 70 | 1 |
| 5 | 20 | 48 | 1 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Harga | Pelayanan | Cluster |  | No | Harga | Pelayanan | Cluster |
| 1 | 100 | 100 | 1 |  | 26 | 59 | 43 | 2 |
| 2 | 80 | 54 | 2 |  | 27 | 44 | 59 | 1 |
| 3 | 31 | 98 | 1 |  | 28 | 77 | 44 | 2 |
| 4 | 78 | 52 | 2 |  | 29 | 84 | 91 | 1 |
| 5 | 82 | 63 | 2 |  | 30 | 74 | 76 | 1 |
| 6 | 70 | 59 | 2 |  | 31 | 42 | 74 | 1 |
| 7 | 30 | 100 | 1 |  | 32 | 33 | 42 | 1 |
| 8 | 42 | 30 | 2 |  | 33 | 93 | 86 | 2 |
| 9 | 49 | 45 | 2 |  | 34 | 77 | 93 | 1 |
| 10 | 48 | 36 | 2 |  | 35 | 32 | 21 | 2 |
| 11 | 90 | 10 | 2 |  | 36 | 31 | 32 | 1 |
| 12 | 58 | 38 | 2 |  | 37 | 77 | 31 | 2 |
| 13 | 54 | 80 | 1 |  | 38 | 52 | 89 | 1 |
| 14 | 98 | 31 | 2 |  | 39 | 67 | 52 | 2 |
| 15 | 52 | 78 | 1 |  | 40 | 33 | 46 | 1 |
| 16 | 11 | 82 | 1 |  | 41 | 94 | 33 | 2 |
| 17 | 59 | 70 | 1 |  | 42 | 34 | 94 | 1 |
| 18 | 10 | 90 | 1 |  | 43 | 63 | 34 | 2 |
| 19 | 30 | 42 | 1 |  | 44 | 87 | 63 | 2 |
| 20 | 45 | 49 | 1 |  | 45 | 38 | 77 | 1 |
| 21 | 36 | 48 | 1 |  | 46 | 21 | 38 | 1 |
| 22 | 10 | 79 | 1 |  | 47 | 64 | 21 | 2 |
| 23 | 40 | 70 | 1 |  | 48 | 19 | 64 | 1 |
| 24 | 99 | 100 | 1 |  | 49 | 30 | 19 | 2 |
| 25 | 10 | 61 | 1 |  | 50 | 70 | 42 | 2 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Harga | Pelayanan | Cluster |  | No | Harga | Pelayanan |  |
| 51 | 10 | 48 | 1 |  | 76 | 69 | 45 | 2 |
| 52 | 95 | 94 | 2 |  | 77 | 13 | 11 | 2 |
| 53 | 70 | 21 | 2 |  | 78 | 69 | 20 | 2 |
| 54 | 10 | 64 | 1 |  | 79 | 11 | 87 | 1 |
| 55 | 65 | 50 | 2 |  | 80 | 18 | 39 | 1 |
| 56 | 90 | 49 | 2 |  | 81 | 30 | 70 | 1 |
| 57 | 39 | 24 | 2 |  | 82 | 56 | 13 | 2 |
| 58 | 57 | 31 | 2 |  | 83 | 18 | 69 | 1 |
| 59 | 78 | 28 | 2 |  | 84 | 48 | 11 | 2 |
| 60 | 95 | 79 | 2 |  | 85 | 10 | 18 | 1 |
| 61 | 80 | 42 | 2 |  | 86 | 98 | 30 | 2 |
| 62 | 27 | 31 | 1 |  | 87 | 83 | 56 | 2 |
| 63 | 59 | 78 | 1 |  | 88 | 40 | 18 | 2 |
| 64 | 86 | 35 | 2 |  | 89 | 20 | 48 | 1 |
| 65 | 78 | 70 | 2 |  | 90 | 63 | 10 | 2 |
| 66 | 39 | 80 | 1 |  | 91 | 30 | 98 | 1 |
| 67 | 26 | 27 | 1 |  | 92 | 61 | 83 | 1 |
| 68 | 22 | 59 | 1 |  | 93 | 60 | 40 | 2 |
| 69 | 54 | 86 | 1 |  | 94 | 59 | 20 | 2 |
| 70 | 61 | 78 | 1 |  | 95 | 44 | 63 | 1 |
| 71 | 45 | 39 | 2 |  | 96 | 11 | 30 | 1 |
| 72 | 11 | 26 | 1 |  | 97 | 80 | 25 | 2 |
| 73 | 20 | 22 | 1 |  | 98 | 74 | 27 | 2 |
| 74 | 87 | 54 | 2 |  | 99 | 42 | 75 | 1 |
| 75 | 39 | 61 | 1 |  | 100 | 33 | 11 | 2 |