Clustering Techniques

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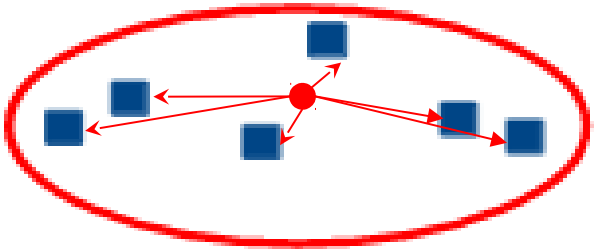
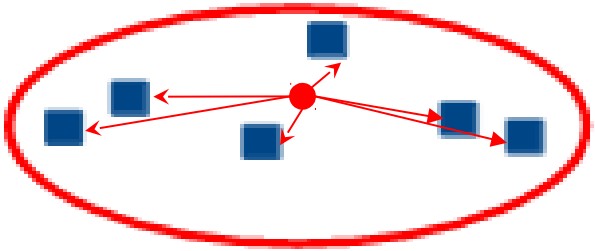
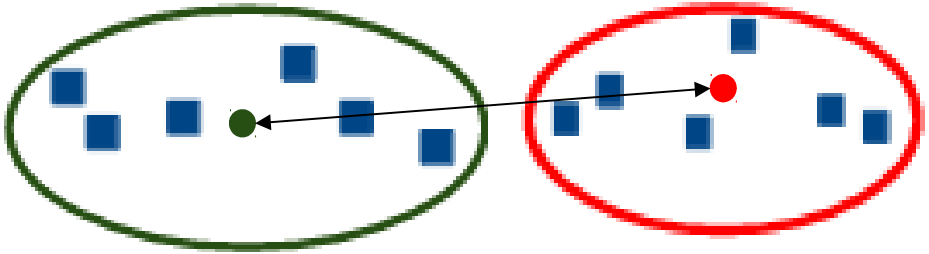


Intra cluster distance

Clustering Techniques



Intra cluster distance



Inter cluster distance

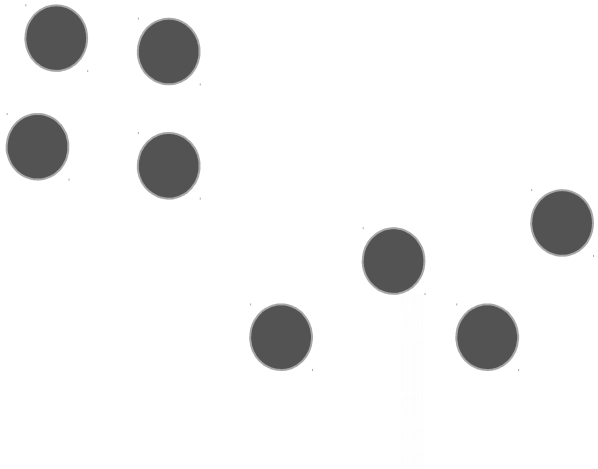
K-means

- Centroid based algorithm
- Each cluster has a centroid

K-means

Objective : To minimize the sum of distances between the points and their respective cluster centroid.

Steps to perform K-means



Steps to perform K-means

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k = 2

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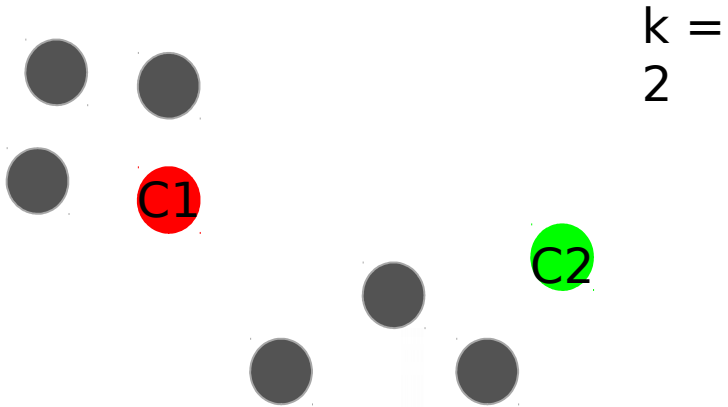

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1. Choose the number of clusters (k)
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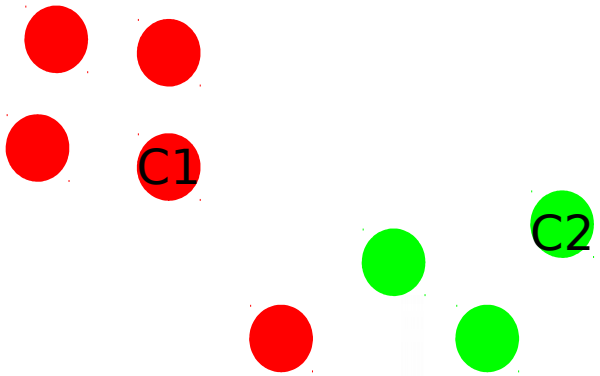

Steps to perform K-means

1. Choose the number of clusters (k)
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4. Recompute centroids of newly formed clusters

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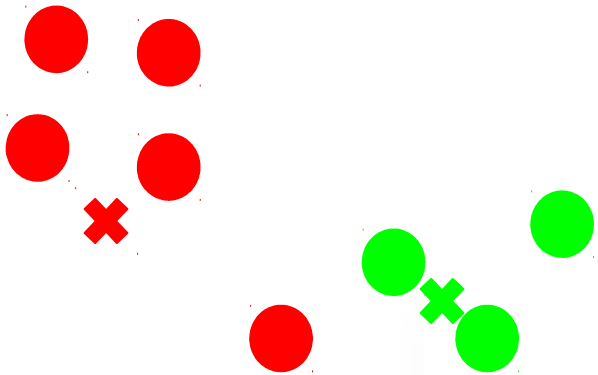

Analytics Vidhya
Learn everything about analytics

Steps to perform K-means

1. Choose the number of clusters (k)
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5. Repeat step 3 and 4.

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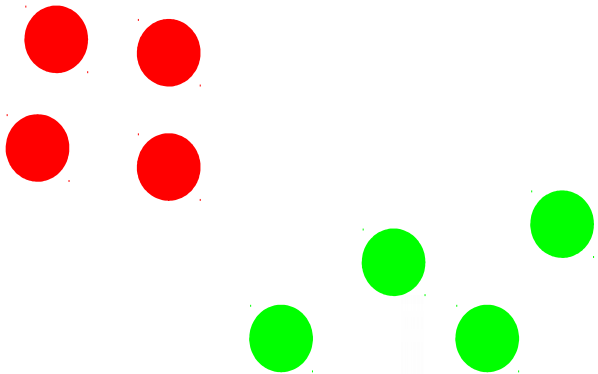

Stopping Criteria for K-means

1. Centroids of newly formed clusters do not change

2. Points remains in the same cluster

3. Maximum number of iterations are reached

How to measure similarity between points?

Euclidean Distance

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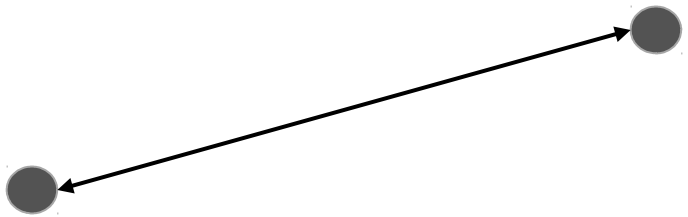
Euclidean Distance

Similar

How to measure similarity between points?

Euclidean Distance



Not
Similar

How to measure similarity between points?

Euclidean Distance

$$D = \sqrt{(p_1 - q_1)^2 + (p_2 - q_2)^2 + \cdots + (p_i - q_i)^2 + \cdots + (p_n - q_n)^2}$$

n = number of variables

$p_1, p_2, p_3, \ldots$ = features of first point

$q_1, q_2, q_3, \ldots$ = features of second point

Issue with distance based algorithms

- Age
- Income (rupees)

Issue with distance based algorithms

ID	Age	Income(rupees)
1	25	80,000
2	30	100,000
3	40	90,000
4	30	50,000
5	40	110,000

Issue with distance based algorithms

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Euclidean Distance =

$[(100000 - 80000)^2 + (30 - 25)^2]^{1/2}$

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Euclidean Distance =

$[(100000 - 80000)^2 + (30 - 25)^2]^{1/2}$

$= 20000.000625$

Issue with distance based algorithms

Solution : Scaling or

Normalizing

Need to scale the data

ID	Age	Income(rupees)
1	-1.192	-0.260
2	-0.447	0.608
3	1.043	0.173
4	-0.447	-1.563
5	1.043	1.042

Need to scale the data

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$[(0.608+0.260)^2 + (-0.447+1.192)^2]^{1/2}$

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Euclidean Distance =

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= 1.1438

Thank
You!

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