How to Calculate Distance

How to Calculate Distance

- Manhattan Distance
- Euclidean Distance
- Minkowiski Distance
- Hamming Distance

How to Calculate Distance

- Manhattan Distance

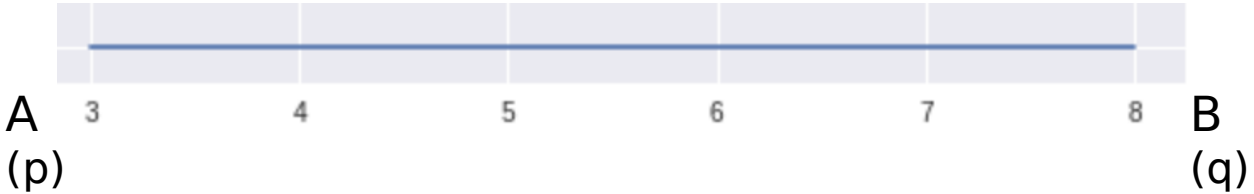
Manhattan Distance

Sum of Absolute differences between the two points, across all dimensions

Manhattan Distance

Sum of Absolute differences between the two points, across all

dimensions



Manhattan Distance

Sum of Absolute differences between the two points, across all

dimensions

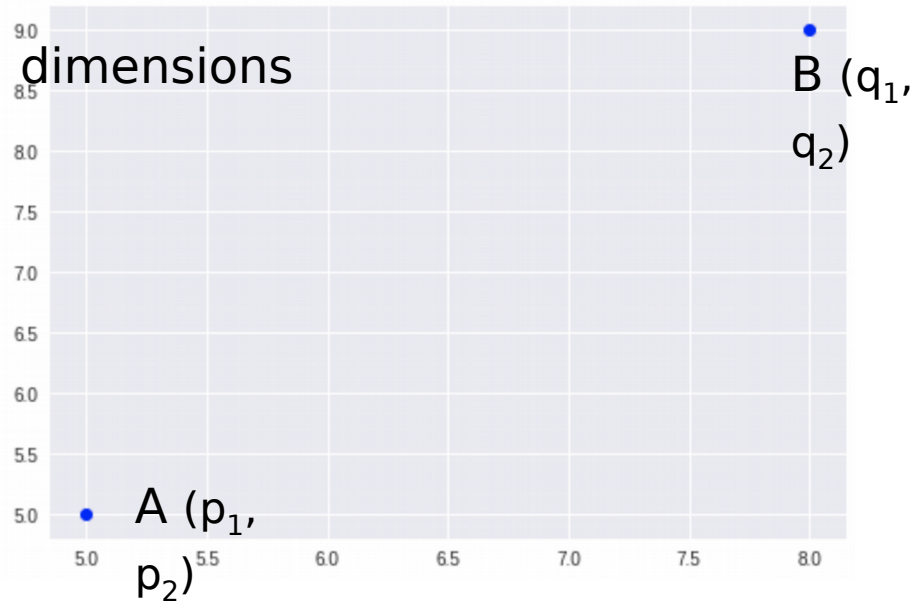
$d = |p - q|$

A
(p)

B
(q)

Manhattan Distance

Sum of Absolute differences between the two points, across all dimensions



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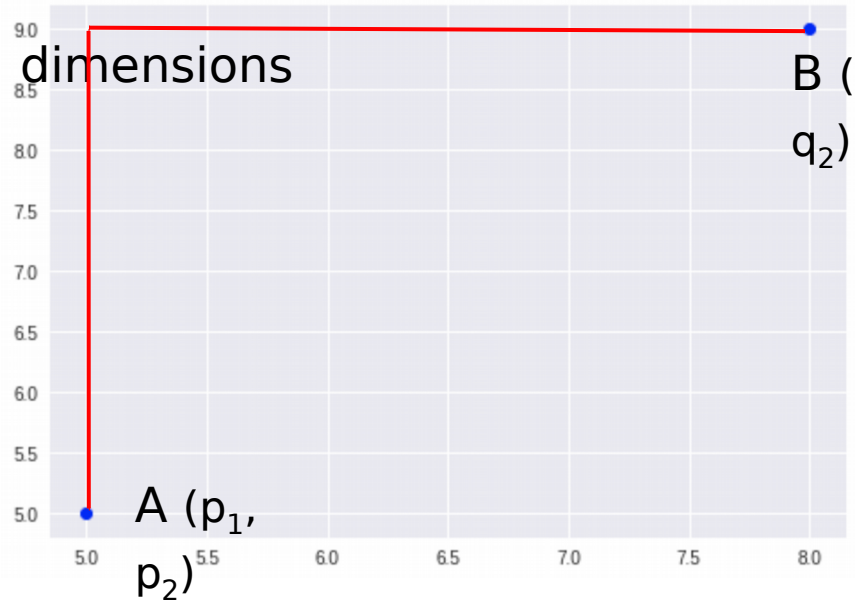
Manhattan Distance

Sum of Absolute differences between the two points, across all dimensions



$$d = |p_1 - q_1| + |p_2 - q_2|$$

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Manhattan Distance

Sum of Absolute differences between the two points, across all

One Dimension:	$d = \|p - q\|$
Two Dimensions:	$d = \|p_1 - q_1\| + \|p_2 - q_2\|$
n Dimensions:	$d = \|p_1 - q_1\| + \|p_2 - q_2\| + \ldots + \|p_n - q_n\|$

Manhattan Distance

Sum of Absolute differences between the two points, across all

One Dimension: $d = |p - q|$

Two Dimensions: $d = |p_1 - q_1| + |p_2 - q_2|$

n Dimensions: $D_m = \sum_{i=1}^{n} |p_i - q_i|$

n = number of dimensions

p_i , q_i = data points

How to Calculate Distance

- Manhattan Distance
- Euclidean Distance

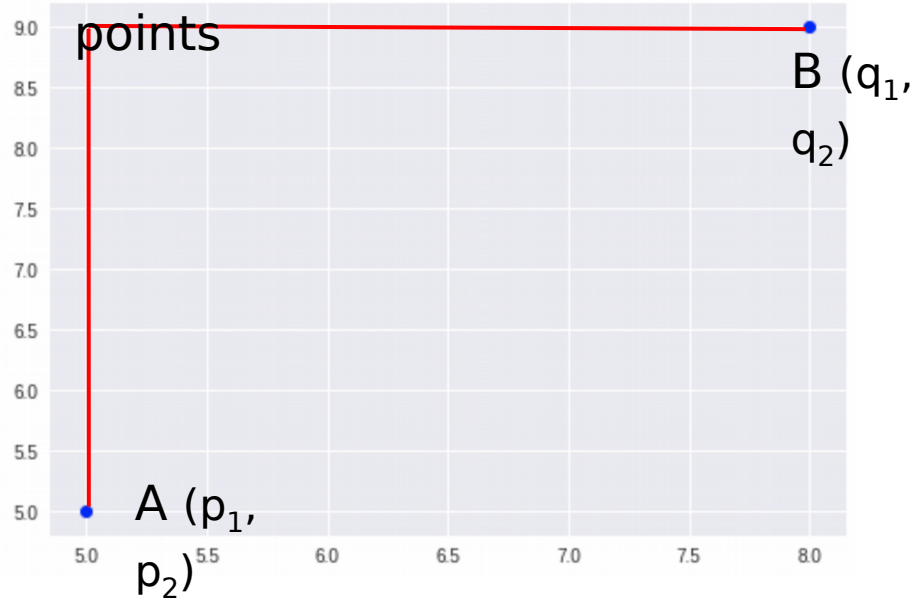
Euclidean Distance

The Shortest distance between two

points

Euclidean Distance

The Shortest distance between two points



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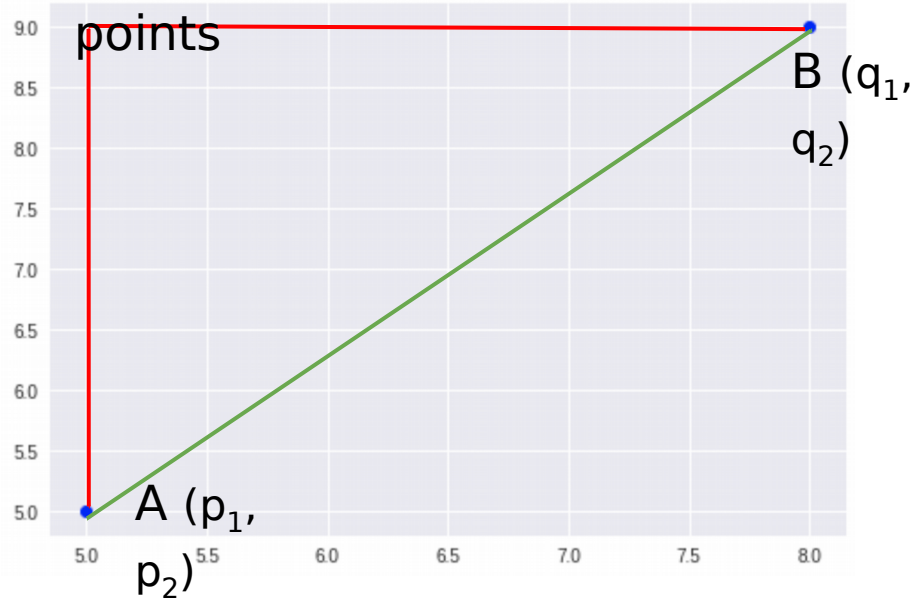
Euclidean Distance

The Shortest distance between two points



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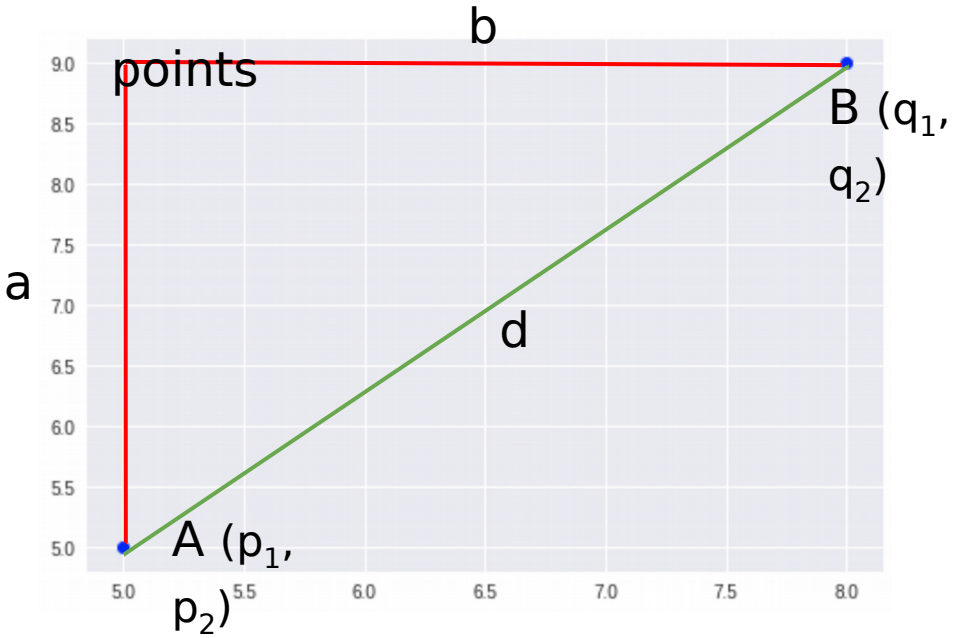
Euclidean Distance

The Shortest distance between two points



$$d = (b^2 + a^2)^{1/2}$$

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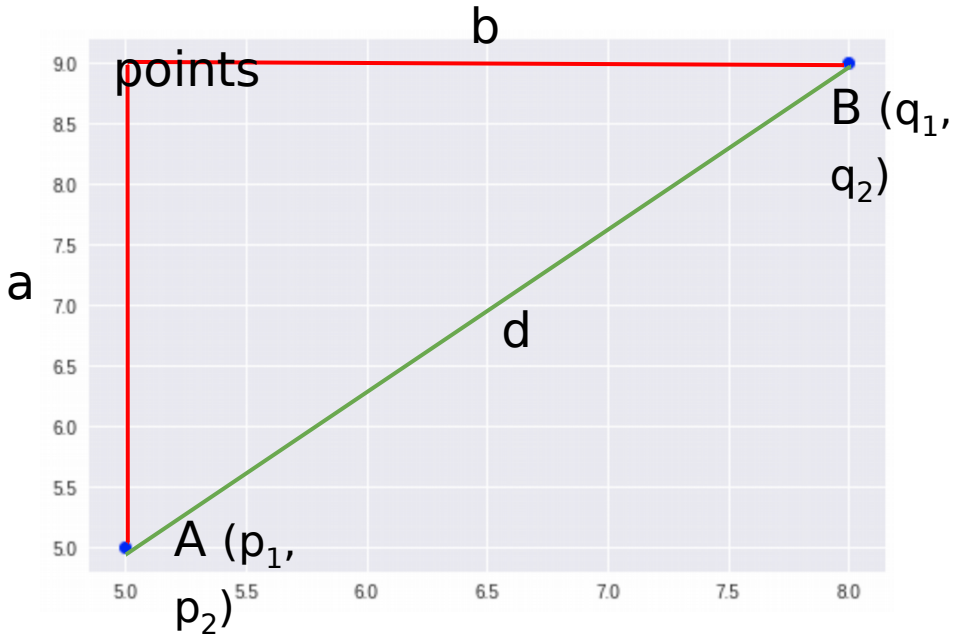
Euclidean Distance

The Shortest distance between two points



$$d = (b^2 + a^2)^{1/2}$$

$$d = ((p_1 - q_1)^2 + (p_2 - q_2)^2)^{1/2}$$

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Euclidean Distance

The Shortest distance between two points

Two Dimensions: $d = ((p_1 - q_1)^2 + (p_2 - q_2)^2)^{1/2}$

Three Dimensions: $d = ((p_1 - q_1)^2 + (p_2 - q_2)^2 + (p_3 - q_3)^2)^{1/2}$

Euclidean Distance

The Shortest distance between two points

Two Dimensions: $d = ((p_1 - q_1)^2 + (p_2 - q_2)^2)^{1/2}$

Three Dimensions: $d = ((p_1 - q_1)^2 + (p_2 - q_2)^2 + (p_3 - q_3)^2)^{1/2}$

n Dimensions: $d = ((p_1 - q_1)^2 + (p_2 - q_2)^2 + (p_3 - q_3)^2 + \ldots (p_n - q_n)^2)^{1/2}$

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Euclidean Distance

The Shortest distance between two points

2 Dimensions: $d = ((p_1 - q_1)^2 + (p_2 - q_2)^2 + (p_3 - q_3)^2 + \ . \ . \ . \ . (p_n - q_n)^2)^{1/2}$

n Dimensions: $D_e = \left(\sum_{i=1}^{n} (p_i - q_i)^2 \right)^{1/2}$

n = number of dimensions

p_i , q_i = data points

How to Calculate Distance

- Manhattan Distance $D_m = \sum_{i=1}^{n} |p_i - q_i|$

- Euclidean Distance $D_e = \left(\sum_{i=1}^{n} (p_i - q_i)^2 \right)^{1/2}$

How to Calculate Distance

- Manhattan Distance $D_m = \sum_{i=1}^{n} |p_i - q_i|$
- Euclidean Distance $D_e = \left(\sum_{i=1}^{n} (p_i - q_i)^2 \right)^{1/2}$

$$D = \left(\sum_{i=1}^{n} |p_i - q_i|^k \right)^{1/k}$$

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How to Calculate Distance

- Manhattan Distance $D_m = \sum_{i=1}^{n} |p_i - q_i|$
- Euclidean Distance $D_e = \left(\sum_{i=1}^{n} (p_i - q_i)^2 \right)^{1/2}$
- Minkowiski Distance $D = \left(\sum_{i=1}^{n} |p_i - q_i|^p \right)^{1/p}$

How to Calculate Distance

- Manhattan Distance
- Euclidean Distance
- Minkowiski Distance
- Hamming Distance

Hamming Distance

Total number of differences between two strings of identical

length

Hamming Distance

Total number of differences between two strings of identical length

ID	Gender	Strings
A	Male	0
B	Female	1
C	Male	0

Hamming Distance

Total number of differences between two strings of identical

ID	Gender	Marital Status	Employment Status
A	Male	Married	Self Employed
B	Female	Married	Salaried
C	Male	Unmarried	Unemployed

Hamming Distance

Total number of differences between two strings of identical

ID	Gender	Marital Status	Employment Status
A	Male	Married	Self Employed
B	Female	Married	Salaried
C	Male	Unmarried	Unemployed

ID	Gender	Marital Status	Employment Status
A	0	0	1
B	1	0	2
C	0	1	3

Hamming Distance

Total number of differences between two strings of identical

ID	Gender	Marital Status	Employment Status
A	Male	Married	Self Employed
B	Female	Married	Salaried
C	Male	Unmarried	Unemployed

ID	Gender	Marital Status	Employment Status	Strings
A	0	0	1	0 0 1
B	1	0	2	1 0 2
C	0	1	3	0 1 3

Hamming Distance

Total number of differences between two strings of identical

ID	Gender	Marital Status	Employment Status
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ID	Gender	Marital Status	Employment Status	Strings
A	0	0	1	0 0 1
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C	0	1	3	0 1 3

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