

Math Assignment-1



From:

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Task 1, additional task, task 3 on paper

No. _____
Date _____

2.) $(6,2) \& (9,7) = \sqrt{(9-6)^2 + (7-2)^2}$
 $= 3^2 + 5^2 = \sqrt{34}$
 $= 5,83$

3.) $(3,4) \& (6,9) = \sqrt{(6-3)^2 + (9-4)^2}$
 $= 3^2 + 5^2 = \sqrt{34}$
 $= 5,83$

! task 3

Manhattan $|x_2 - x_1| + |y_2 - y_1|$

1.) $(2,4) \& (3,6) = |3-2| + |6-4|$
 $= 1 + 2 = 3$

2.) $(2,4) \& (5,3) = |5-2| + |3-4|$
 $= 3 + 1 = 4$

3.) $(2,4) \& (7,1) = |7-2| + |1-4|$
 $= 5 + 3 = 8$

4.) $(2,4) \& (6,8) = |6-2| + |8-4|$
 $= 4 + 4 = 8$

estudee 30 lines (6mm spaced)

Task 2

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Task 2
Task 2

[2] from scipy.spatial import distance

p1 = (1,2)
p2 = (4,5)

d = distance.euclidean(p1,p2)
print("Euclidean distance : ", d)

Euclidean distance :  4.242640687119285
```

Task 4

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Task 4

[3] import numpy as np
def cityblock_distance(A,B):

    result = np.sum([abs(a-b) for (a,b) in zip(A,B)])
    return result

if __name__ == "__main__":
    arr1 = [1,2,13,5]
    arr2 = [1,27,3,4]
    result = cityblock_distance(arr1,arr2)

    print("The cityblock distance between 2 arrays is : ", result)

The cityblock distance between 2 arrays is :  36
```

Task 5

Definitions:

Euclidean Distance: Euclidean distance is a measure of the straight-line or "as-the-crow-flies" distance between two points in Euclidean space. It is the most common distance metric and is based on the Pythagorean theorem.

City Block Distance (Manhattan Distance): City block distance, also known as Manhattan distance, calculates the distance between two points by summing the absolute differences between their coordinates along each axis. It mimics the path a person would take when walking in a city grid.

Formulas:

Euclidean Distance in 3 Dimensions:

$$\text{Euclidean Distance} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$$

Euclidean Distance in n Dimensions:

Euclidean Distance = $\sqrt{((x_2 - x_1)^2 + (y_2 - y_1)^2 + \dots + (x_n - x_1)^2)}$

City Block Distance in 3 Dimensions:

City Block Distance = $|x_2 - x_1| + |y_2 - y_1| + |z_2 - z_1|$

City Block Distance in n Dimensions:

City Block Distance = $|x_2 - x_1| + |y_2 - y_1| + \dots + |x_n - x_1|$

Real-Life Examples:

Euclidean Distance:

GPS Navigation: When you use GPS for driving directions, it calculates the Euclidean distance between your current location and your destination as the shortest path.

Machine Learning: In clustering algorithms like k-means, Euclidean distance is used to determine the similarity between data points. Data points closer in Euclidean space are considered more similar.

City Block Distance (Manhattan Distance):

Taxi Routes: In a city with a grid-like road system, taxi drivers often calculate fares based on the Manhattan distance, as they can only travel along streets that align with the city blocks.

Robotics: When programming a robot to move in a grid-based environment (e.g., a warehouse), the Manhattan distance is used to determine the minimum number of moves needed to reach a target location.

In summary, Euclidean distance measures the straight-line distance between two points in space, while City Block distance measures the distance traveled along grid-like paths. Both have practical applications in various fields, from navigation to data analysis and robotics.