

Find the Closest Pair of Points

In this problem, a set of n points are given on the 2D plane, we have to find the pair of points, whose distance is minimum. The algorithm used is Divide and Conquer.

To solve this problem:

- We have to divide points into two halves, after that smallest distance between two points is calculated in a recursive way.

$$\text{Distance formula} = d(P, Q) = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

- Using distances from the middle line, the points are separated into some strips.
- We will find the smallest distance from the strip array.
- At first two lists are created with data points, one list will hold points which are sorted on x values, another will hold data points, sorted on y values.

The time complexity of this algorithm will be $O(n \log n)$.

Algorithm:

Divide: draw vertical line with $n/2$ points on each side.

Conquer: find closest pair on each side, recursively.

Combine: find closest pair with one point in each side.

Output:

```
C:\Users\RishyaKP\Desktop\Curneu\closest_pair_of_points.exe
*****
      Finding Closest Pair of Points
*****
Minimum Distance: 0.128878
Closest Pair: (-3.85174,-0.945158) (-3.97198,-0.89877)
Process returned 0 (0x0)   execution time : 0.141 s
Press any key to continue.
```