Closest Pair Report

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Results

Our implementation produces the expected results on all input-output file pairs.

The following table shows the closest pairs in the input files wc-instance-14.txt. Here n denotes the number of points in the input, and (u, v) denotes a closest pair of points at distance d.

n	u	v	d
14	(-0.5, 0.0)	(-0.125, 3.0)	3.0234

Implementation details

We resort by y-coordinates in each recursive step. For the comparison of points close to s in S_y we inspect 15 points, as explained (5.10) of Kleinberg and Tardos, Algorithm Design, Addison-Wesley 2008. Here is the corresponding part of our code:

```
min = Double.MAX_VALUE;

count ;

        for (Point s : Sy)

                count = 0;

                for [int I = 0 ; I < Sy.length; i++]

                        if(count++ > 16)

                                break;

                        if (s.distance(Sy[i]) < min)

                                min = s.distance(S[i]);
```

We combine the information from the recursive calls in linearithmic time instead of linear, thus the relation has the form of T(N) = 2T(N/2) + cNlogN. By unrolling the relation we identify that $T(n) \rightarrow cn\ \Sigma^{\log 2\ n-1} \log(n/2^j)$. It lies between nlogn and n^2. We also took the chance to implement concepts introduced in Practical Concurrent and Parallel Programming.