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Pearls of Algorithms

Winter 2014/15

Exercise sheet 2.1

Exercise 1 Voronoi region complexity

Show that for all $n > 3$, there exists a set of n points in the plane, such that one Voronoi region has got $n - 1$ vertices on its boundary.

Exercise 2 L_1 bisector example

Choose two points p and q in the plane, such that the line through them is not parallel to the x- or y-axis. Then draw the bisector of p and q in the L_1-norm

$$\|p - q\|_1 = |p_x - q_x| + |p_y - q_y|$$

Exercise 3 Nearest Neighbour

Let $S \subset \mathbb{R}^2$ be a finite set of points and let $p \in S$. Of how many points $q \in S \setminus \{p\}$ may p be a nearest neighbour?

Exercise 4 Closest Pair

Let n points be given in the plane. Describe how to compute the distance of a closed pair in time $O(n \log n)$ using a *Divide and Conquer*-algorithm. Explain the correctness and running time.