Assignment no. 5

self-training

Exercise 5.1 Do the breakpoints of the beach line in Fortune's algorithm always move downwards when the sweep line moves downwards? Prove this or give a counterexample.

Exercise 5.2 Let L be a set of lines in the plane. Give an $O(n \log n)$ time algorithm to compute an axis-parallel rectangle that contains all the vertices of the arrangement $\mathcal{A}(L)$ in its interior.

Exercise 5.3 Let S be a set of n segments in the plane. A line ℓ that intersects all segments of S is called a *transversal* or *stabber* for S.
(a) Give an $O(n^2)$ algorithm to decide if a stabber exists for S.
(b) Now assume that all segments in S are vertical. Give an expected linear time algorithm to decide if a stabber for S exists.
(CGAA Ex. 8.16)

Exercise 5.4 Given a set P of n points in the plane, describe an $O(n^2)$-time algorithm to find the three points of P that determine the triangle of minimum area.

Exercise 5.5 Show that any two triangulations of a planar point set can be transformed into each other by edge flips. (Show first that any two triangulations of a convex polygon can be transformed into each other by edge flips.)