Algorithmics

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6. Fundamentals of Algorithmic Geometry
6.2 Sweep Techniques

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Application: Computation of Voronoi diagrams by plane sweep

Objects of SSS:

- Right vertical line L
- Left beach line consisting of:
  - Parabolic segments of Bisector (p,L),
    given by p and the adjacent segments to top and bottom
    and by the respective spikes (see below)
  - Spikes: Bisektors B(p,q) for two adjacent reference points p and q.
    Each beach line segment has got two adjacent spikes
    (except for the first and the last).
  - Intersection points of adjacent spikes, sorted by y-coordinate

Lemma: The overall size of the beach line and hence of SSS is of order O(n)

References:

Klein, Kap. 6.3 (in German), de Berg et al., ch. 7.2

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Application: Computation of Voronoi diagrams by plane sweep

Events and actions during sweep:

- Spike event: Intersection of adjacent spikes: Associated beach line segment vanishes.
- Point event: New point is passed: Generation of new beach line segment.
  This required the computation of new spikes and spike events.

Run time: Update of events in O(log n)

O(n) events ➔ **Total time complexity**: O(n log n)

This is optimal!

References:

Klein, Kap. 6.3 (in German), de Berg et al., ch. 7.2