CSCE-620/VIZA-670 Computational Geometry

Fall 2025

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Assignment # 2
(Due October 29)

1. (Voronoi diagram) Pick arbitrary 15 points in the plane (with no four co-circular), draw the Voronoi diagram for this set of points.

2. (Halfplane intersection) Given n half-planes in E^2

$$a_i x + b_i y + c_i \geq 0 \qquad i = 1, 2, \cdots, n$$

where a_i, b_i, and c_i are all real numbers. Use divide-and-conquer technique to show that the convex polygonal region formed by their intersection can be computed in $O(n \log n)$ time.

3. (The closest pair) Given two sets of points A and B in the plane, use Voronoi diagram to compute

$$\min_{a \in A, b \in B} distance(a, b)$$

(in the Euclidean metric) in time $O(n \log n)$ (this should include the time for constructing the Voronoi diagram), where $n = |A| + |B|$.

4. (On-line convex hull) Suppose that points of a set S are given in increasing order by x-coordinate: $S = \{p_1, p_2, \cdots, p_n\}$. Design an algorithm such that when the point p_i is given, the algorithm constructs the convex hull of the set $S_i = \{p_1, p_2, \cdots, p_i\}$, for $i = 1, \cdots, n$. Analyze your algorithm.