Math 282 — 1 April 2019

Algorithm for adding a new site to a Voronoi diagram

↳ p (inside the convex hull of existing sites)

(1) Find the region which contains the new site.

↳ Vor(p_1) so p_1 is the closest existing site to p

(2) Draw the perpendicular bisector of the segment pp_1. This ⊥ bisector intersects the boundary of Vor(p_1) in exactly 2 points, call them x_1 and x_2.

(3) Let Vor(p_2) the other voronoi region on the voronoi edge containing x_1. Draw the perpendicular bisector of pp_2, which intersects the boundary of Vor(p_2) at x_1 and x_3.

(4) Repeat step 3, working around the new Voronoi cell, until the segments form a closed polygon.

(5) Delete parts of old Voronoi edges that are inside the new region Vor(p).

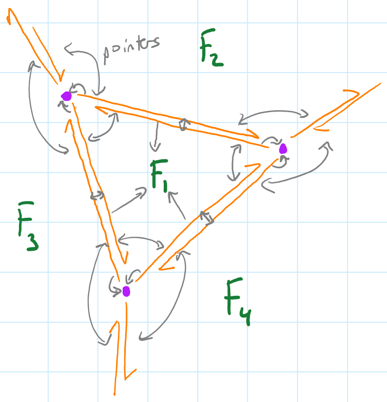
How would a Voronoi diagram be stored in memory?

Doubly Connected Edge List (DCEL)

A data structure for storing 2D graphs, that permits adjacency queries.

The DCEL contains 3 lists:

- Vertices: store 2D coordinates, and a pointer to an adjacent edge
- Edges: consist of two opposite "half edges", each of which have pointers to adjacent edges and an adjacent face.
- Faces: store a pointer to an adjacent edge, and also any other relevant data


pointers
F_2
F_1
F_3
F_4