Assignment 4 2014

In this assignment a DCEL data structure is created to represent a Delaunay triangulation. Then , from this representation the corresponding Voronoi diagram constructed, again using a DCEL data structure. In the latter process an important observation is that for every triangle in a Delaunay triangulation *dt* it holds that its circumscribed circle does not contain points of *dt* in its interior.

A In the program *assignment4A2013.py* a Delaunay triangulation is given. Using the data in *cens, edgs, triPts, neigs* create a DCEL structure *DCELdt (*see book) representing this triangulation. Can you do this by only using combinatorial operations or do you also need geometric operations? Using this representation, walk around the outer boundary of *DCELdt* and high-light its segments. Verify visually that this is the convex hull of the original set of points.

B Choose some triangle from *DCELdt* and draw its circumscribed circle. Verify viually that no other points of *dt* are inside this circle. Repeat this for two other triangles.

C Using *DCELdt* create a data structure *DCELvd* representing the Voronoi diagram of the original set of points. Can you do this by only using combinatorial operations or do you also need geometric operations? Using this representation, walk around the outer boundary of *DCELvd* and high-light the half-edges on this path. Here, only half-edges of finite faces are meant.