CRUST Algorithm

MATH 261 Computational Geometry

1. Suppose S is a sample of points from a curve C. Assuming the sample is sufficiently dense, justify the following statements:

(a) The Voronoi vertices of $\text{Vor}(S)$ lie near the medial axis of C.

(b) Any circumscribing disk of an incorrect edge of the Delaunay triangulation $\text{Del}(S)$ (an edge between two sample points that are not consecutive on C) crosses the medial axis of C.

(c) Let V be the set of Voronoi vertices of $\text{Vor}(S)$. An incorrect edge of $\text{Del}(S)$ cannot also appear in the Delaunay triangulation $\text{Del}(S \cup V)$.

(d) Each correct edge of $\text{Del}(S)$ also appears in $\text{Del}(S \cup V)$.

2. Suppose S is a sample of points from a curve C. Justify the following statements related to the NN-CRUST algorithm:

(a) Let $p \in S$ be any sample point and q its nearest neighbor. If the sample is sufficiently dense, then edge pq is correct.

(b) Let $p \in S$ be any sample point and q its half neighbor. If the sample is sufficiently dense, then edge pq is correct.