1.8 Choice of Kriging Support

The support set used to krige to a given point can be chosen in several fashions. The traditional way is to choose all points within the range of influence no matter the possible under-representation of certain directions. If this is not feasible because of the number points involved, a search radius smaller than the range of influence is often chosen. As a first step to avoid under-representation of certain directions Conradsen, Ersbøll, Nielsen, Pedersen, Stern, & Windfeld (1991) suggest to use the same number of support points from each quadrant in a coordinate system with the kriging point as origin. An elaboration of this technique is based on the Delaunay triangulation.

1.8.1 Delaunay Triangulation

The Delaunay triangulation partitions the plane into triangles, where the edges constitute connections between neighboring points. No edges intersect. There are many possible triangulations in a point-set, but the Lawson criterion (Ripley, 1981) states that the most open triangles, that is, the triangles with the smallest angle as large as possible, should be chosen. The formal definition of the triangulation comes from the definition of the dual state, the so-called Voronoi tessellation.

Given a point C in the point-set $\mathcal{P}$. Points within the set having a Euclidean distance to C smaller than to any other point in $\mathcal{P}$ constitute the Voronoi polygon of C. Points equidistant from a pair of points, constitute the polygon boundaries. Points equidistant from three or more points constitute vertices. The Voronoi polygons of $\mathcal{P}$ constitute a Voronoi tessellation. The polygons are convex.

The Delaunay triangulation may now be defined in the following way: Two points are connected with an triangulation edge, if the Voronoi polygons of the two points have an edge in common.

Figure 1.4 shows a Delaunay triangulation and the dual Voronoi tessellation of the same point-set. Note that the triangulation edges form a convex hull spanned by $\mathcal{P}$, and that the points on the edge of the convex hull have open polygons.

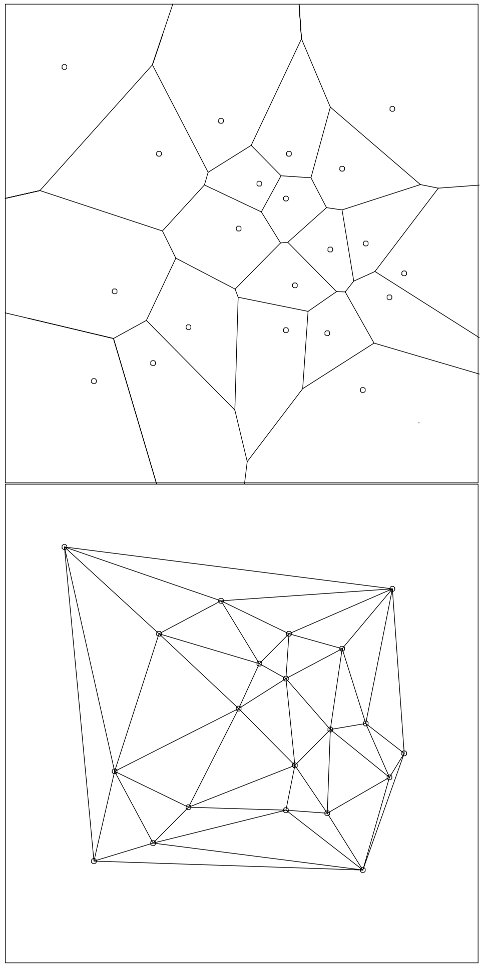

Figure 1.4: Voronoi tessellation (top), Delaunay triangulation (bottom)