

# Constrained Voronoi Diagram And Application

## (Extended Abstract)

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This paper deals with the explaining of Voronoi diagram. Many applications of the Voronoi diagram have been found usefully in GIS, DTM etc, however it can possible to divide their into four main categories; nearest neighbor search, facility location, largest empty circle, path planning. The new demands like optimum zoning for emergency services makes us to pay close attention to the more efficient Voronoi diagram. After a review of definitions, four types of applications; i.e. Nearest neighbor search, Facility location, Largest empty circle, Path planning; are presented.

In this work we introduce so-called *constrained Voronoi diagram* (CVD), which is constrained to follow a given set of edges. CVD can be used in many applications. An algorithm based on finding nearest node of the network to Voronoi edge is suggested. As an example; in our case study; the polygons must follow along streets and roads. The general suggested algorithm is presented and test on emergency services in Mashhad city.

The base map is merged from seven Mashhad's maps in scale of 1:25000 prepared by National Cartographic Center of Iran. The latest location information about emergency services is prepared by a tourism oriented GIS called NAJM. The operation is done on MICROSTATION software. The figure 1 and 2 show the result of standard and constrained voronoi diagram, respectively.

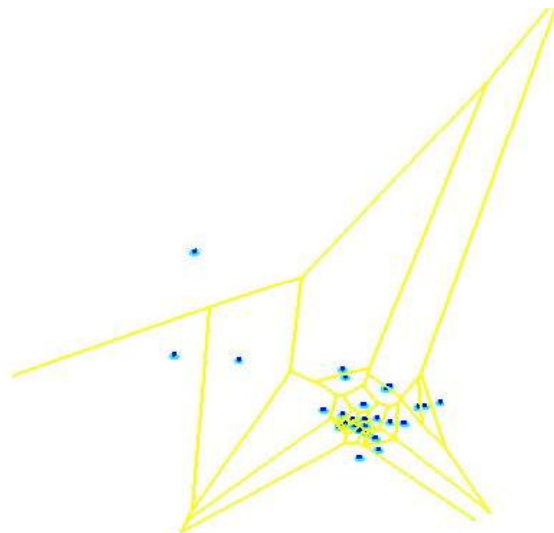


Figure 1: The result of Voronoi diagram



Figure 2: The result of Constrained Voronoi diagram

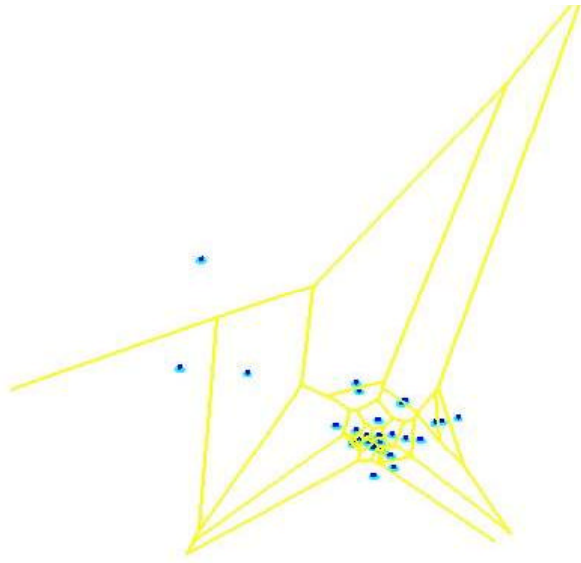


Figure 1: The result of Voronoi diagram



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