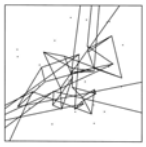
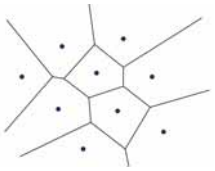


Voronoi Diagrams and Their Applications

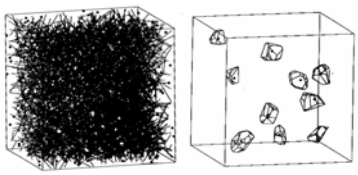
Kokichi Sugihara

What is the Voronoi diagram?

Tessellation of the space into regions according to the nearest site criterion



2-d Voronoi diagram



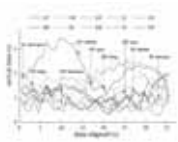
3-d Voronoi diagram

Nests of ant lions?

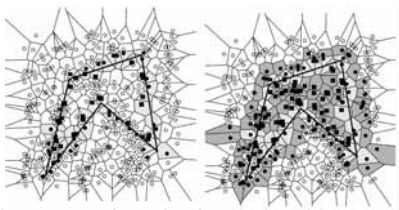
Nests of fishes

Columnar joint

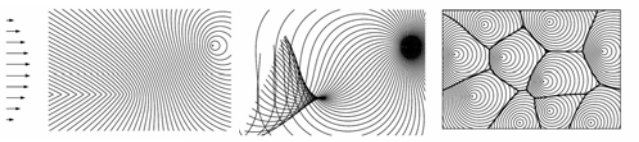
Function 1. We can detect territories.



Analysis of teamwork in a hokey game

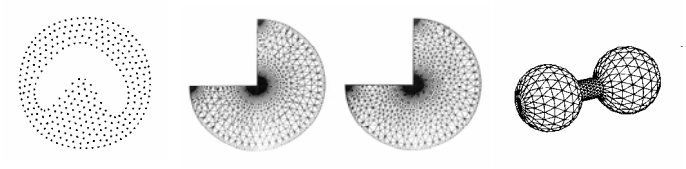


Quick enumeration of points belonging to a given region



Voronoi diagram in a flow filed

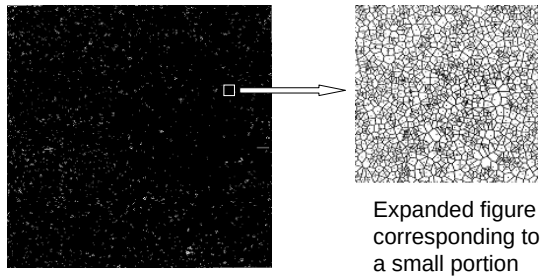
Function 2. We can detect neighbor relations.



Generation of high-quality meshes

Detection of the docking surface between proteins

Superrobust computation of the diagram

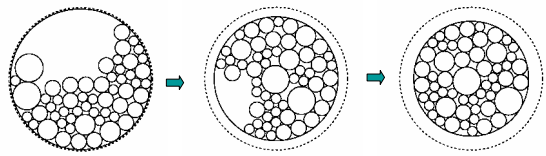


Voronoi diagram for one million sites

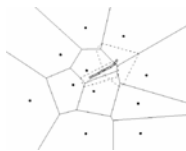
Expanded figure corresponding to a small portion

Function 3. We can detect the structure of vacant space.

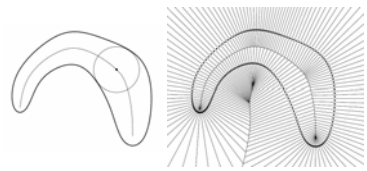
Digital Voronoi diagram



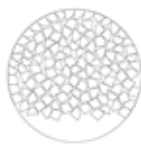
Estimation of the size of a wire bundle



Optimal location search



Extraction of medial axis



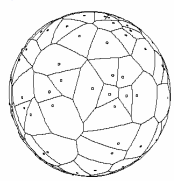
Packing for part cutting

Minimum enclosing circle

Generalizations of the Voronoi diagram

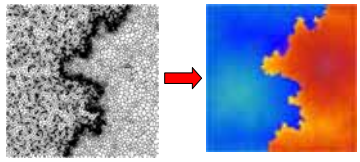
Voronoi diagram for line segments

Voronoi diagram in L_∞ distance



Voronoi diagram on a sphere

Another application



Generation of artistic patterns