VoroComp User Guide

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1 Introduction

The `VoroComp` program is designed to compute Voronoi diagrams. It consists of two parts, namely, a graphical user interface (GUI) interacting with the user and computational kernel (CK) computing Voronoi Diagram.

2 What is a Voronoi Diagram

A Voronoi diagram for a point set S on a plane partitions the plane into |S| polygonal regions, one for each point of S. The Voronoi cell of point x consists of all points of the plane which are closer to x than any other point of S.

3 System Requirements

The VoroComp program is written in pure Java and is platform independent. To run the program one needs to have Java interpreter (version 1.1.5 or later).

4 Download

VoroComp is freely available. One can download Compiled VoroComp Classes and the Source Code at the Homepage of VoroComp:
http://www.risc.uni-linz.ac.at/people/irents/courses/VoroComp

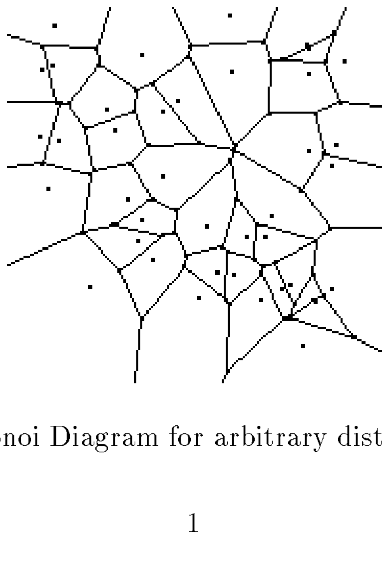

Figure 1: Voronoi Diagram for arbitrary distributed points.

Figure 2: The GUI

5 Installation

Download VoroComp.jar and put it to a directory (installation directory of VoroComp). In the directory uncompress VoroComp.jar:
jar -xvf VoroComp.jar

6 Synopsis

Run from the command line at the VoroComp installation directory:
java GUI.VGUI

7 Graphical User Interface

The graphical user interface (GUI for short) provides a nice frontend to the computational kernel. It allows the user to visualize graphically the input he wants to pass on to the computational kernel.

The GUI consists of two parts: menu system, where user can choose some action described below, and panel with vertical and horizontal scrollbars, where the user is able to place and remove points and see the Voronoi diagram.

After appearing GUI the user can perform the following operations:

- insert points on the panel by

(a) clicking on the left button of mouse or

(b) loading them from a file using File menu bar item Open

- delete inserted points using Edit menu bar item Delete
- compute Voronoi diagram for inserted points using Action menu bar item Compute
- save inserted points in a file using File menu bar item Save
- clear the panel (remove all points) using Action menu bar Reset
- get on-line help about using the program from Help menu bar item Contents
- get information about developers of the program from Help menu bar item About
- exit the program using File menu bar item Exit

We describe below menu bar items:
Menu *File* has entries:

Open - Prompts you for a filename, reads the file which name was specified and displays its contents (points) on the panel. If file with the specified name does not exist new file with this name will be created. If there are points already inserted on the panel, **Open** requires first to save them before opening a file provided that the points were not saved in a file.

Save - If you want to save points from the panel that were not saved before **Save** prompts you for a filename and writes the points in this file. If a file with the specified name already existed it will be overwritten. If you want to save points on which you operated and initially they were loaded from a file then they will be saved in that file. **Save** saves only points but not Voronoi diagrams.

Exit - Exits the program. Before exiting it requires to save points if they are not saved.

Menu *Edit* has entries:

Delete Deletes the last entered point. One can use **Delete** to delete points in reversed order of their appearance. If there are not points to delete then **Delete** performs no action.

Menu *Action* has entries:

Compute - Computes Voronoi Diagram for given points and shows it. If there is at most onepoint **Compute** performs no action. After computing Voronoi diagram adding/deleting a point leads to disappearing Voronoi diagram and only points will be shown. The user can use **Compute** again to compute Voronoi diagram for obtained set of points. **Compute** performs no action if there is already computed diagram on the panel.

Reset - removes all points from the panel. If there were no points on the panel it performs no action.

Menu *Help* has the entry:

About Shows information about developers.

The size of the area of the panel in which the user puts points is 1000x1000 pixels. Only certain part of the area is visible at the moment. Using vertical and horizontal scrollbars the user can scroll up-down and left-right to observe the other parts. Resizing the GUI window changes the size of visible part of the area.

8 File format

One can read from a file (write to a file) points using menu "File" submenu "Open" ("Save"). Such a file containing description of points has usually the extension ".voro". Each line of the file consists of a pair of integers (x and y coordinates of the point) separated by a space.

9 Algorithm

In VoroComp the divide-and-conquer algorithm for computation of Voronoi Diagrams described in [1] is implemented.

10 Authors

Igor Rents, Temur Kutsia and Geert Van der Weyer (contributed in the early stage of the project).

11 Known bugs and limitations

We found some configurations of points when the program worked incorrectly. If you encounter a bug, please, submit it to us. We classify the bugs and in the future versions of the program we will try to annihilate them.

References

[1] *Kurt Mehlhorn.* Data Structures and Algorithms 3: Multi-dimensional Searching and Computational Geometry. Springer, 1984.