Implementing Three Voronoi Diagram Computation Algorithms and Comparing Their Performance

Project Proposal
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Project Description

For the term project, we are implementing and assessing three different algorithms for calculating and visualizing a Voronoi Diagram, given a set of points in two dimensional space. A Voronoi Diagram is a set of points (called seeds) in a two dimensional space bounded by regions that depict the areas on that space in which any chosen point is closest to that area’s seed.

A Voronoi Diagram is a set of bounded regions assigned to points called seeds in which any point chosen inside that region is closest to that region’s seed compared to all regions’ seed given in the diagram.

The three algorithms we will use to form the diagram are:

- Randomized Incremental Algorithm
- Fortune's Algorithm, and
- The Flipping Algorithm

The application will have a simple user interface (UI) so that the user can choose the algorithm to form the diagram, and enter the necessary parameters (number of vertices) for diagram generation. In addition to that, upon completion of the diagram, the time elapsed will be prompted to the user, so that the performance of the algorithms can be observed.

To test the algorithms, arbitrary point sets in two dimensional space will be generated and a reasonable number of test cases will be used to compare the algorithms.

Project Environment

We decided to use Python as our programming language, and Pygame as our API to draw both the UI and visualization of the Voronoi Diagram. We will use Git to share our coding environment.