Developing Three Voronoi Diagram Computation Algorithms and Evaluating Their Performance

The Randomized Incremental Algorithm, Fortune's Algorithm, and Flipping Algorithm are the three Voronoi diagram computing algorithms that we will use in this project. The objective is to evaluate how well they performed in terms of visual output quality and time and spatial complexity.

We will create a software that creates a collection of random points in two dimensions using different distributions as input and computes and graphically displays the 2D Voronoi diagram. When showing or viewing the 2D Voronoi diagram, the program's user-friendly interface will allow you to specify parameters like the number of points, zoom in/out, and translate. For better visualization, we'll give each Voronoi cell a unique color.

To observe the visual outcome of the present Voronoi diagram as the process progresses, we will also show the phases of Fortune's Algorithm. To do this, animated graphics will be used.

We will evaluate our program for arbitrary 2D point sets and report its performance while contrasting the three methods. We'll employ a manageable number of test cases—100 to 1,000,000—in our analysis. Also, we'll make use of the test datasets that Prof. Dr. Jonathan Shewchuk of UC Berkeley contributed for the Delaunay Triangulation Project.

Two students, Onuralp Avcı and Fatih Kaplama will complete the project, and we will divide up the tasks—from implementation to testing and reporting—among us. For this project, the Python programming language and a number of pertinent libraries will be used.