CS 478

Project Proposal

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Delunay Triangulation

Delunay Triangulation is a set of triangles made from a discrete set of vertices so that no vertex lies inside the circumcircle of any triangle in the set. A circumcircle of a triangle is a circle passing through all its vertices [1].

Implementation of Two Delaunay Triangulation Algorithms and Comparing Their Performance

The following algorithms will be implemented and their performances will be compared:

- Randomized Incremental Algorithm
- Plane sweep algorithm that computes a planar Delaunay triangulation using a horizontal line that sweeps upward across the plane.

The program will generate a set of random points in two dimensions utilizing various distributions as input while calculating and visualizing the 2D Delaunay triangulation as graphical output. The program's user interface will include the following features:

- Specified parameters such as the number of points, zoom in/out, rotate and translate while displaying / visualizing the 2D Delaunay triangulation.
- It will be possible to add/remove points to the set interactively.
- It will be possible to see the visual result as the algorithm proceeds.

The program will be tested for arbitrary point sets in 2D and the performance of the implementation will be reported.

Programming Language and Library Selection

Python will be used as the programming language. Following libraries will be utilized:

- https://docs.python.org/3/library/random.html
- https://numpy.org/
- https://matplotlib.org/

References

[1] https://www.youtube.com/watch?v=GctAunEuHt4