CSE 306: RAY TRACER

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Introduction

In this CSE306 project, I implement the Geometry processing lab.
During the last weeks, I implemented the following features:
- Sutherland-Hodgman algorithm for Polygon Clipping.
- Voronoï diagram using Voronoï Parallel Linear Enumeration
- Power Diagram
- Optimal Transport
- Gradient Descent
- Power Diagram weights optimization using LBFGS

Code Structure

We have three files files which are:
- Main.cpp: contains the main functions.
- Geometry.h: contains the parent Geometry class definition.
- Classes.h: contains the Vector class, the Edge and Polygon classes.
- Classes.cpp: contains the vector functions, the Edge, the Intersect function, the inside function, the auxiliary functions to main.cpp

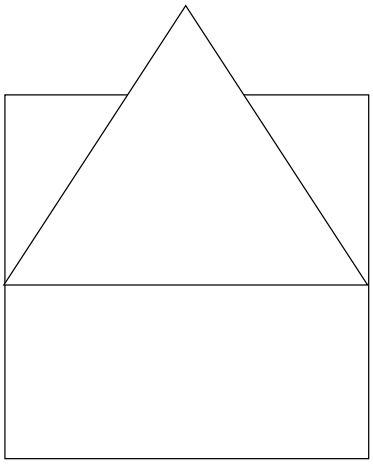

Figure 1: Before Polygon clipping

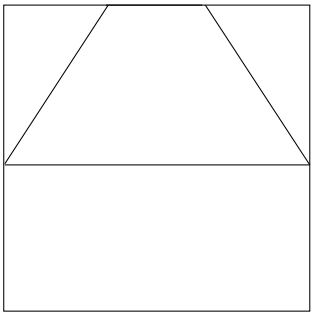

Figure 2: After Polygon clipping

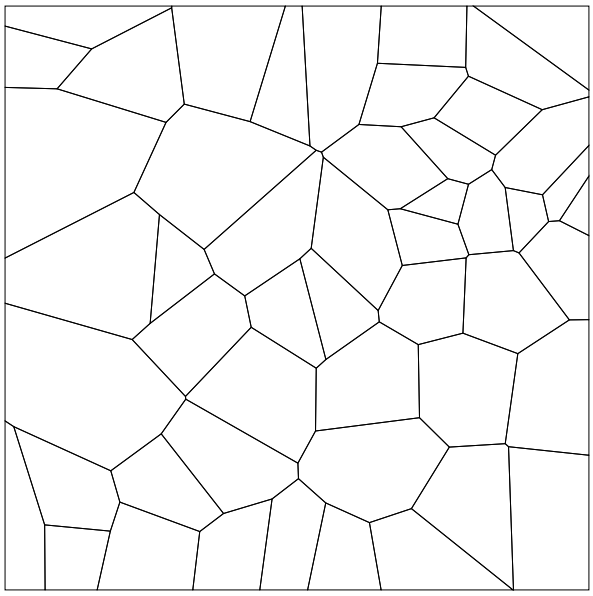

Figure 3: Power Diagram 50

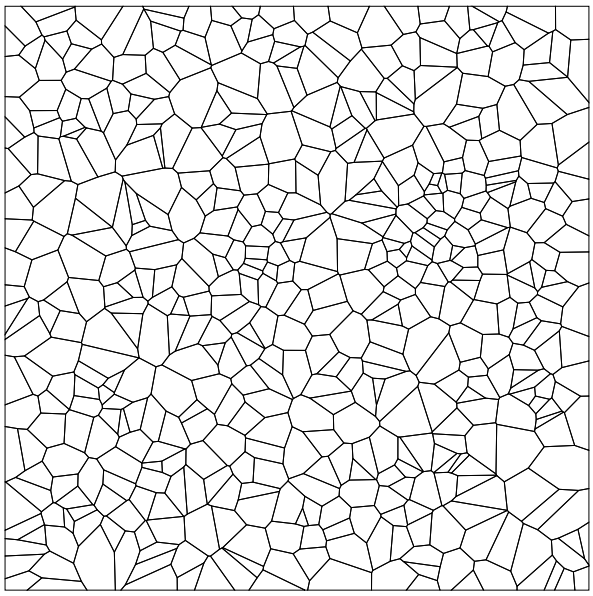

Figure 4: Power Diagram 500

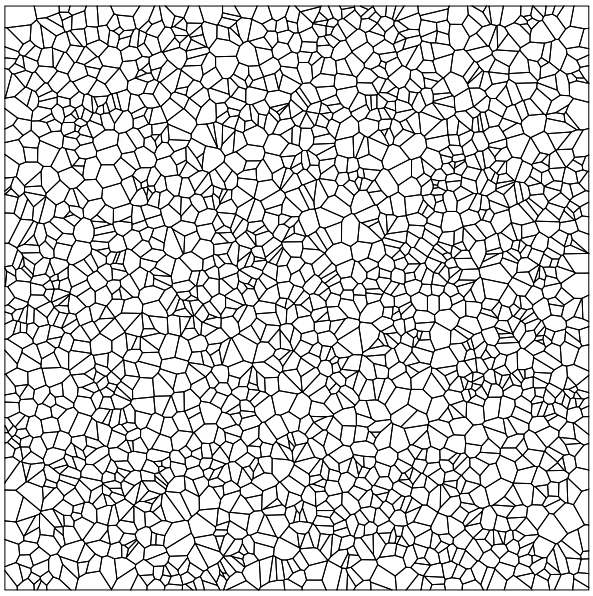

Figure 5: Power Diagram 2000

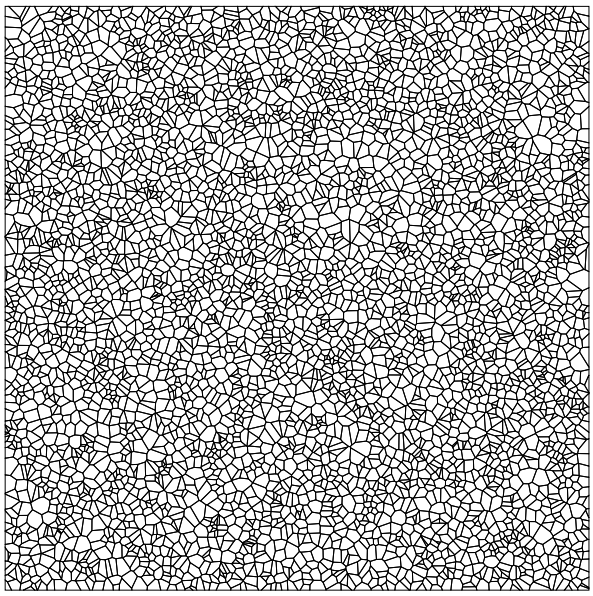

Figure 6: Power Diagram 5000

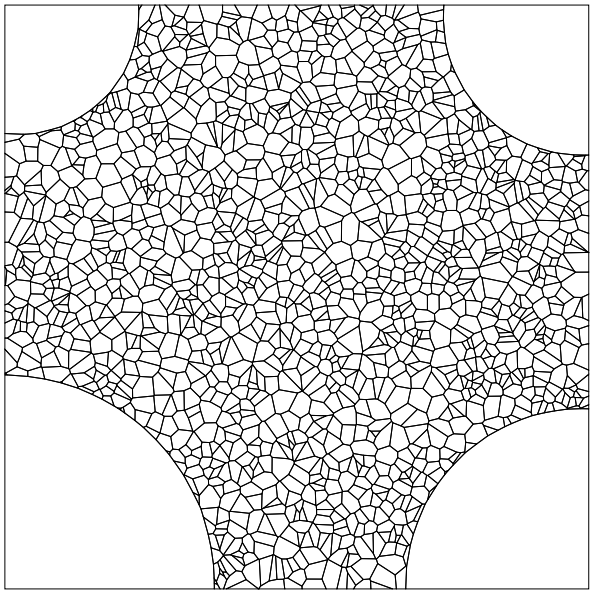

Figure 7: Before Optimization

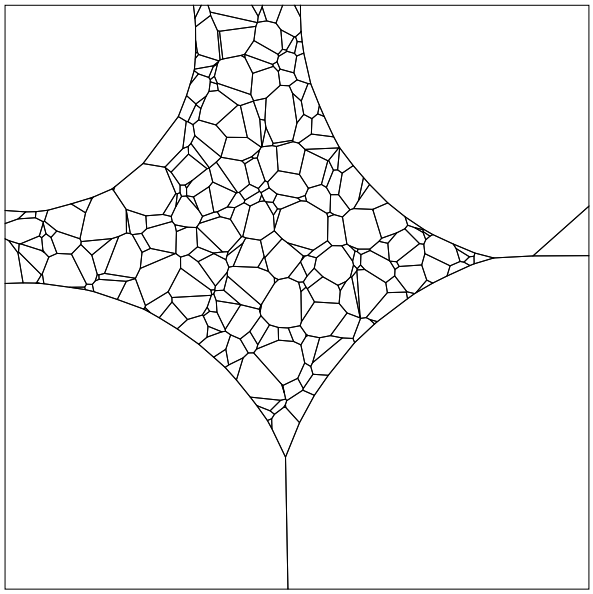

Figure 8: 5 iterations optimization

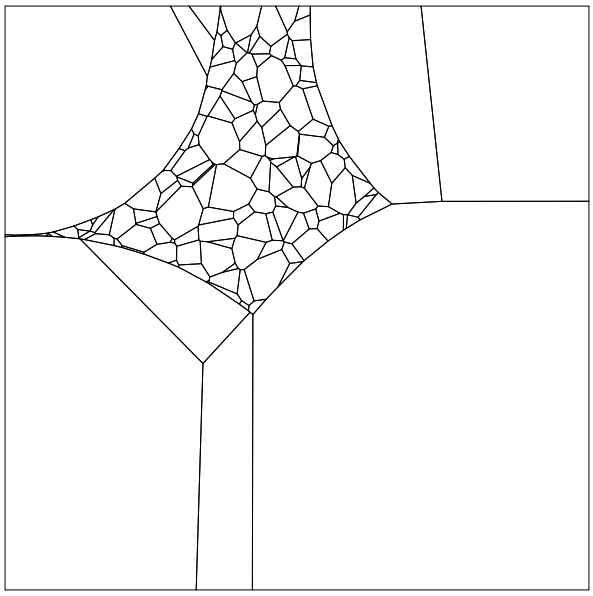

Figure 9: 10 iterations optimization

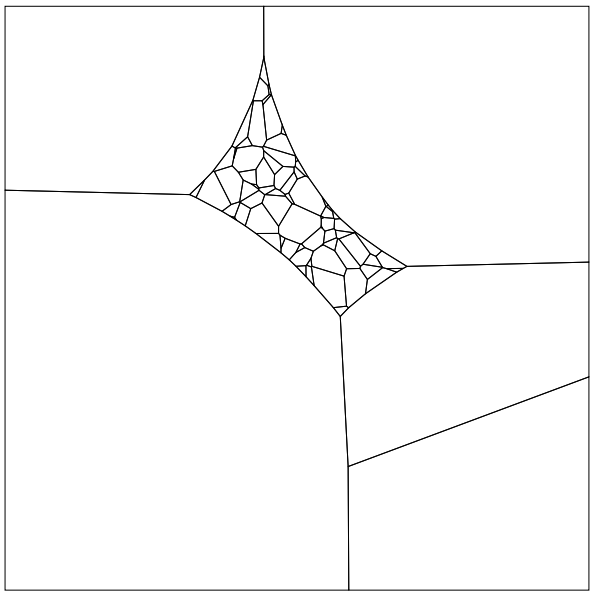

Figure 10: 15 iterations optimization

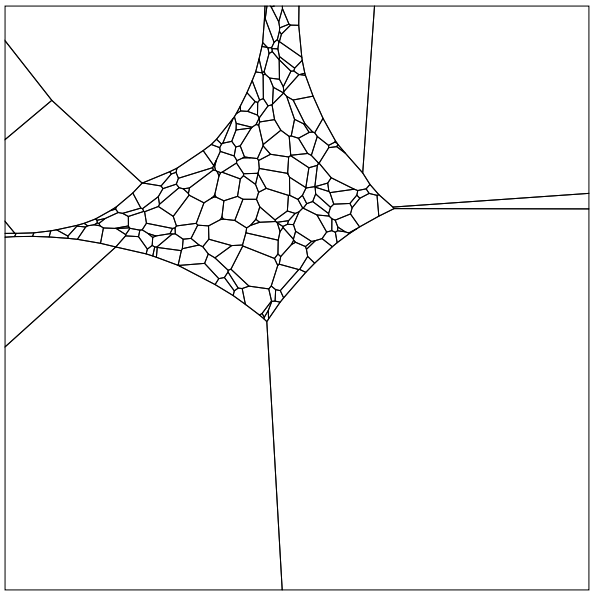

Figure 11: 20 iterations optimization

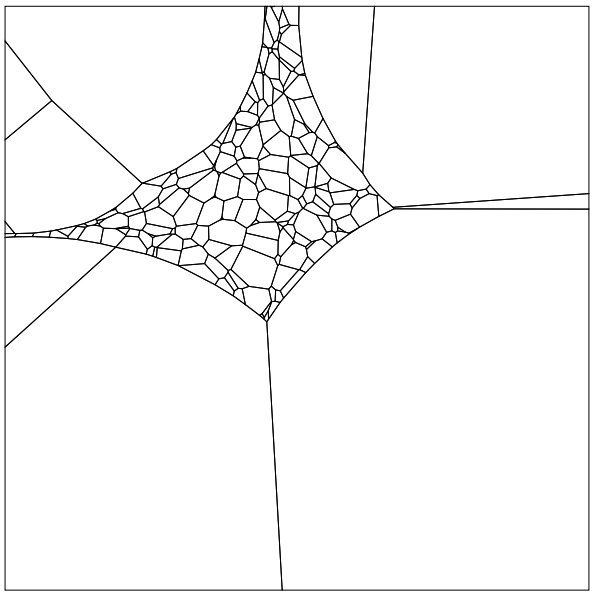

Figure 12: 20 iterations optimization

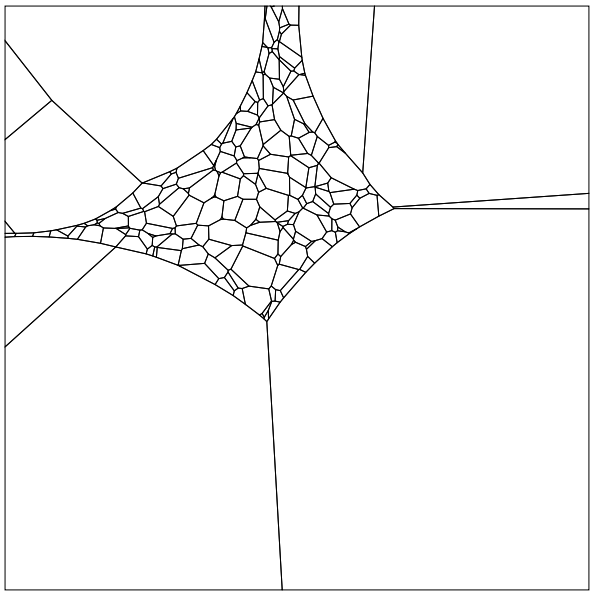

Figure 13: 20 iterations optimization

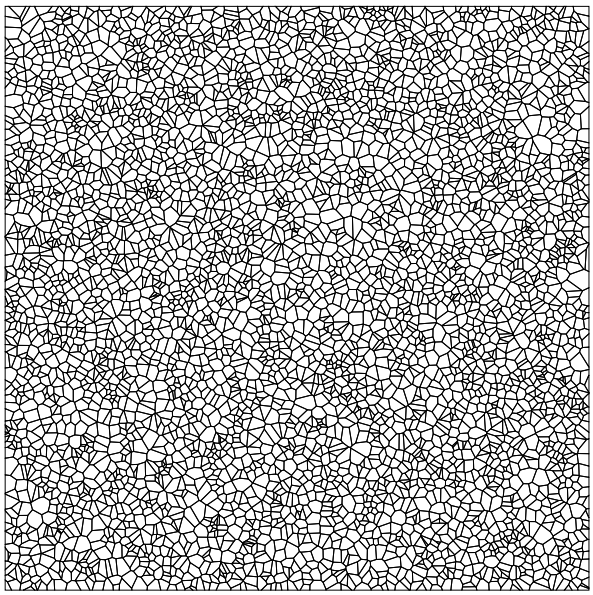

Figure 14: Without Optimization

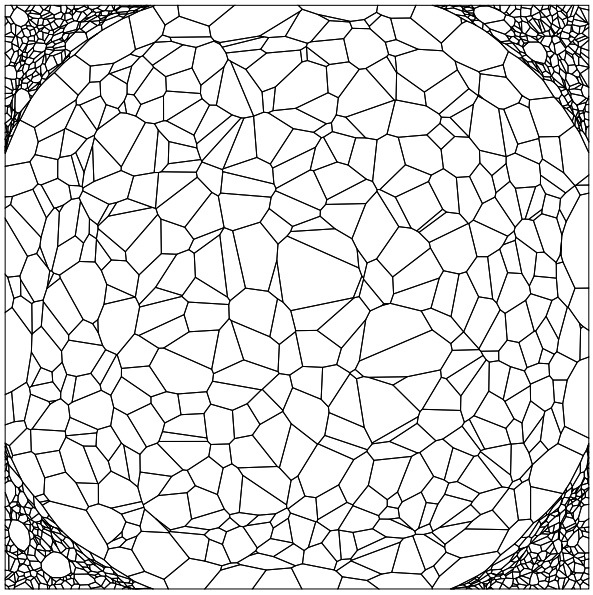

Figure 15: With Optimization 100 Iterations

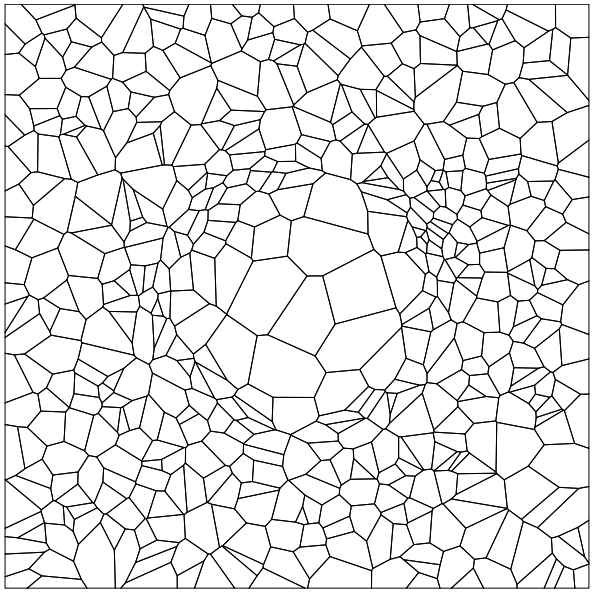

Figure 16: Without Optimization

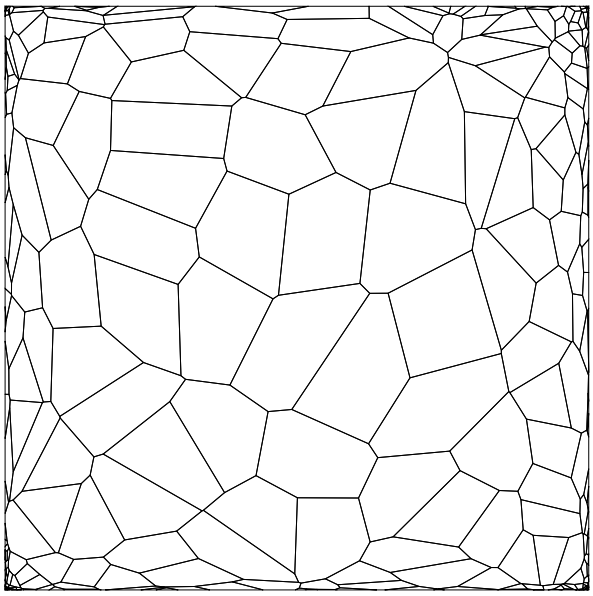

Figure 17: With Optimization

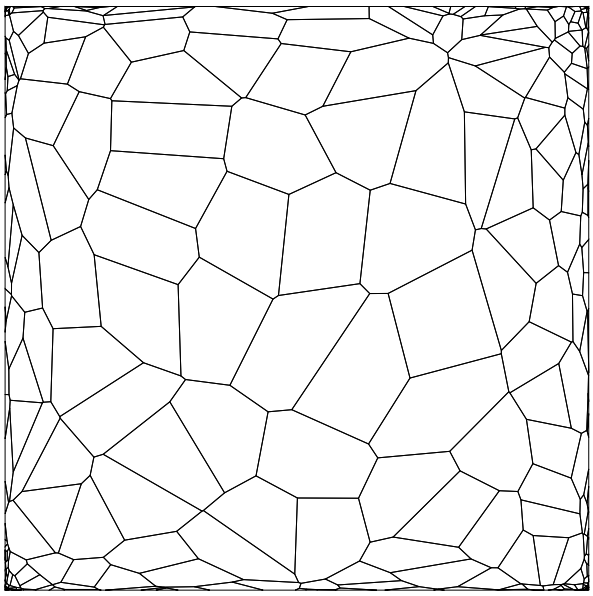

Figure 18: Final Result