Computational Geometry - CSE 555

Optimal Triangulation using Dynamic Programming

Introduction

The problem statement is to compute an optimal triangulation for a simple polygon using dynamic programming. There are various optimization techniques. The techniques were implemented based on the Bellman equation. The software includes:

- Minimum weight triangulation
- Minimised largest of internal angles
- Minimised longest edge

Technologies Used

- Python 2.7
- Matplotlib
- TkInter

Steps To Run The Software

- Input the x and y coordinates of a vertex of a polygon separated by a comma. Each vertex is separated from the other by a space. The ordering of the vertices is clockwise.
- Open terminal. Navigate to the folder containing the file "app.py".
- Run the command "python app.py" on the terminal.
- Choose the button "open file" and select the file containing vertices, followed by selecting an optimization technique from the drop down menu.
- The output can be saved by clicking on the floppy disk button placed on the plot.

Conclusion

The three optimization techniques implemented works only if the given polygon is convex. The implemented techniques can be compared with other techniques like ear-clipping triangulation. Various other optimization techniques such as maximized shortest edge, maximized smallest of internal angle, minimized maximum area of a triangle can be implemented on similar lines.