

CSCI 3250 - Lab 2 Hull2d

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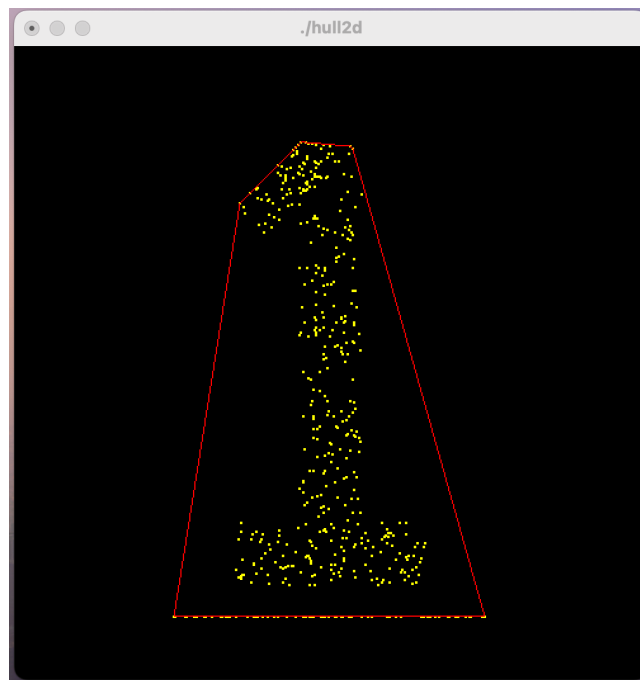
(1) Brief description of what sort of inputs constitute degeneracies for the algorithm and how you handled these degeneracies

The collinear case constitutes a degeneracy for the algorithm. I handled this by sorting the points by their polar angle with respect to the lowest point. If two points have the same polar angle, I remove the one that is further away from the lowest point. In addition, for the rare case of the first three points being collinear, I remove the middle point. (See `geom.cpp:110`)

All pictures are generated with 500 points (e.g., `./hull2d 500`) unless otherwise specified.

(2) Pictures of the two initializers you created

Initializer1:

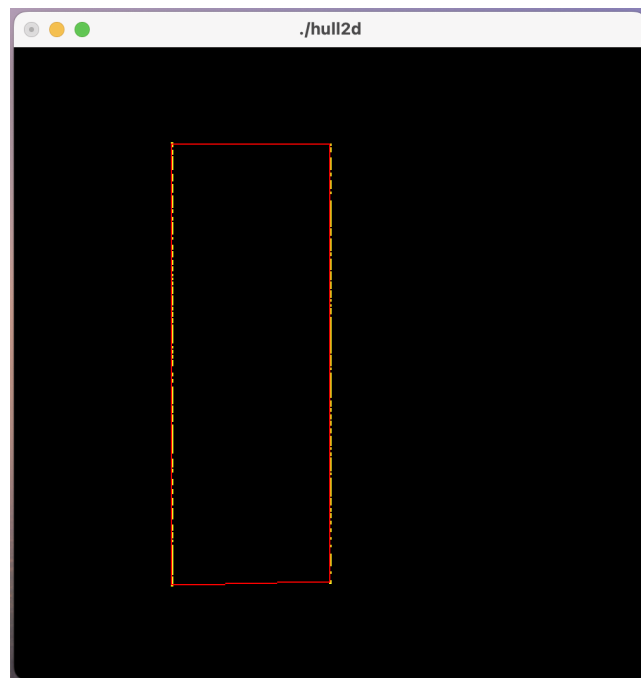


Initializer2:

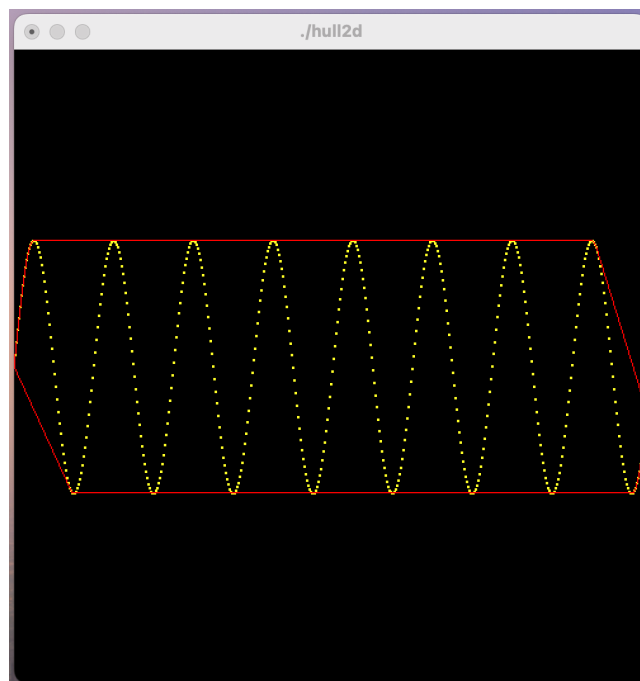


(3) Pictures of the other initializers you used

initialize_points_two_vertical from Ziyu

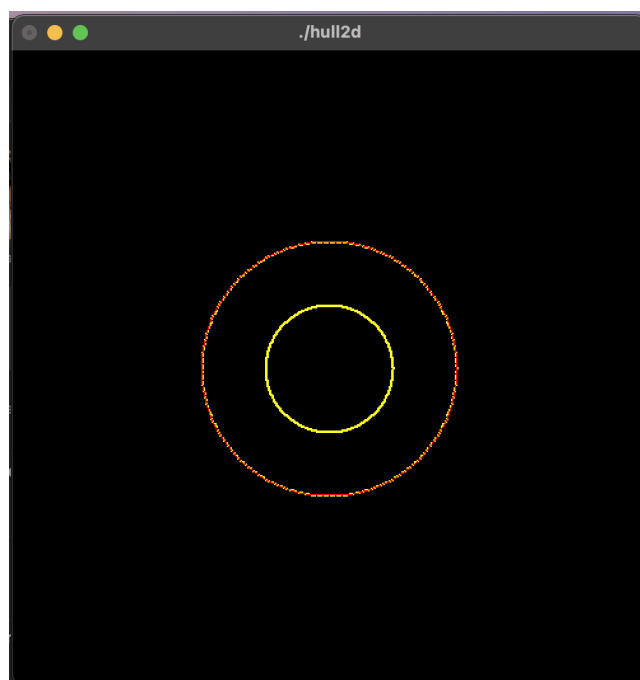


initialize_points_wave from Manny and Jack

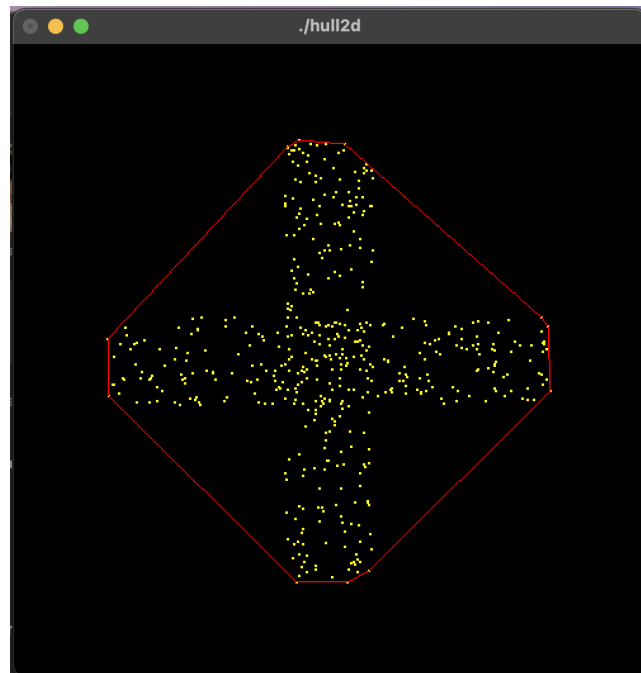


(4) Pictures of the convex hulls computed for each initial configuration of points — for all these choose a reasonable value of n

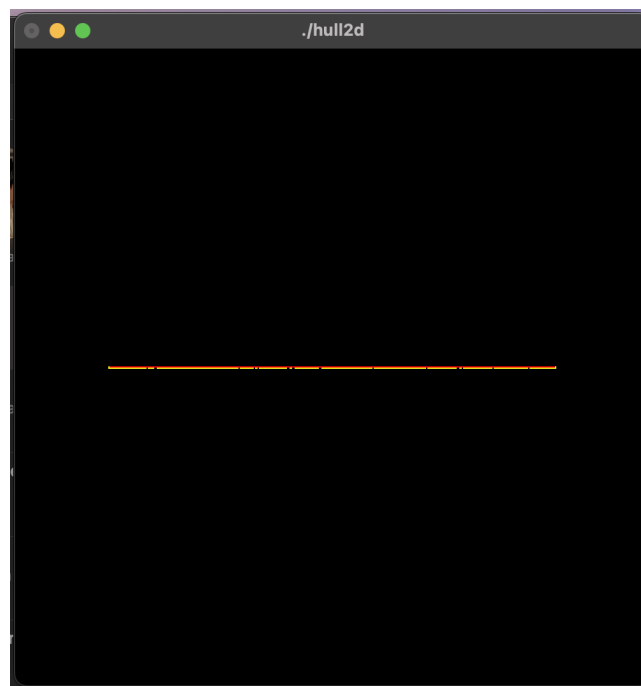
Circle:



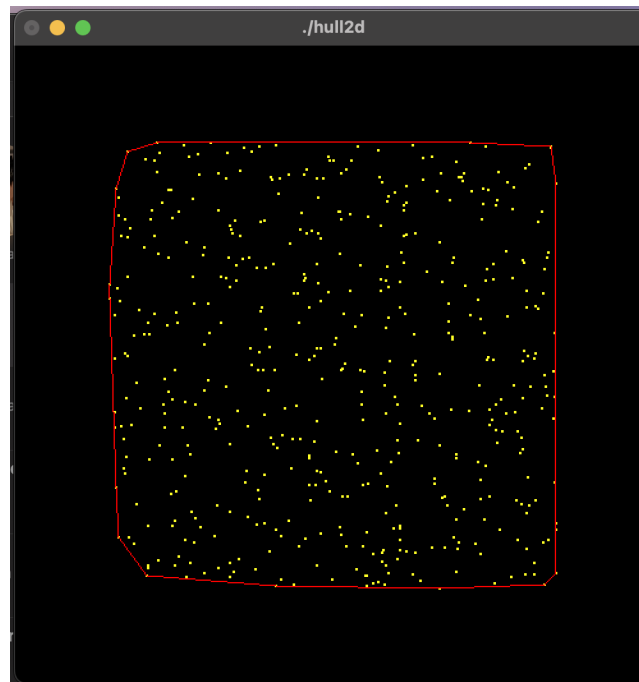
Cross:



Line:



Random:



(6) Time you spent in: Thinking; Programming; Testing; Documenting; Total

I chose to start writing the code after reading the project for around an hour. While writing the code, I was also testing it by constantly recompiling and running the test cases. I spent around 2 hours writing the code and 1 hour testing it. I spent around 30 minutes documenting the code. After ensuring my code passed all four default cases, I spent around 2 hours creating my two initializers (`initializer1` and `initializer2`). In total, I spent approximately 6 hours on this project.

(7) Brief reflection prompts

This project presented a moderate challenge. I had to think carefully about how to handle collinear points and edge cases efficiently. The most significant learning came from tackling degenerate cases and understanding how geometric properties affect algorithmic outcomes. If I were to do it again, I might spend more time testing the performance with different distributions of points. Working individually was effective, but I would be interested in collaborating with others on more complex variations. Moving forward, I'd like to explore how different initializations affect the overall performance and robustness of convex hull algorithms.