Assignment 2

Haozhe Su

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1 Problem 1: Signed Distance Function

1.1 2D Cases

1.1.1 Ellipse

we choose the input shape as an ellispse with $a = 100, b = 80$. View data.txt for more details.

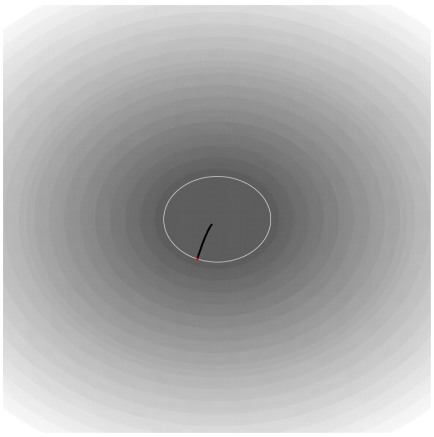

Figure 1: Ellipse with initial guess at an inside point $(390, 410)$

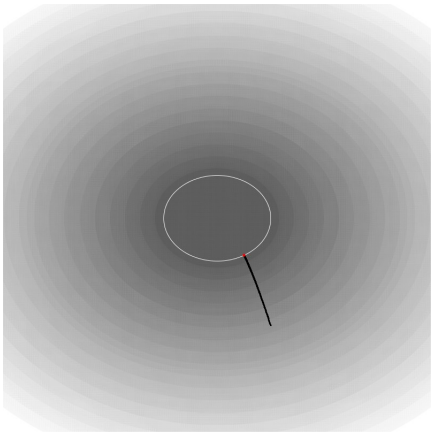

Figure 2: Ellipse with initial guess at an outside point $(500, 600)$

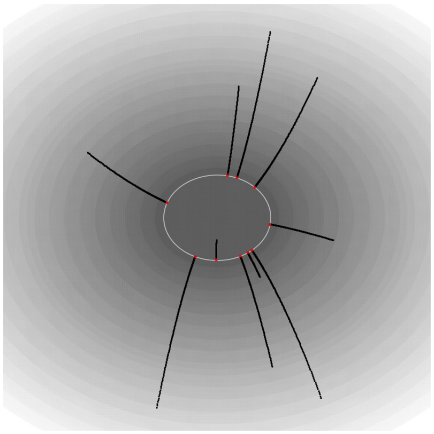

Figure 3: Ellipse with random points

1.1.2 Circle

we choose the input shape as a circle with $r = 100$ View data.txt for more details.
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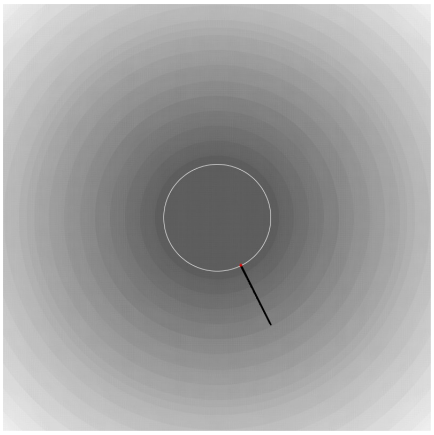

Figure 4: Circle with initial guess at an outside point $(500, 600)$

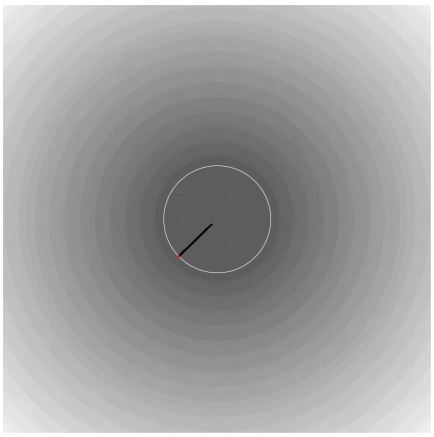

Figure 5: Circle with initial guess at an inside point $(340, 410)$

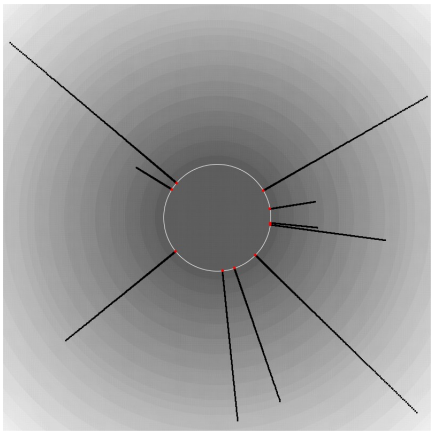

Figure 6: Circle with random points

1.1.3 Rect

we choose the input shape as a circle with $width = 100, height = 80$ View data.txt for more details.

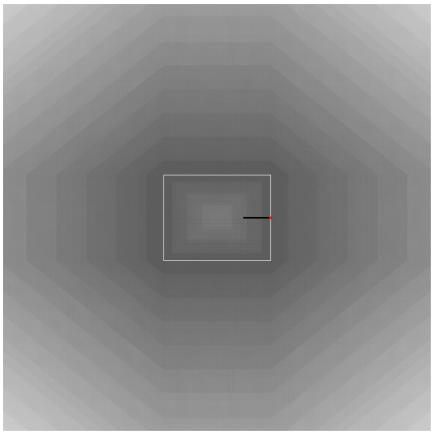

Figure 7: Rect with initial guess at an inside point $(450, 400)$

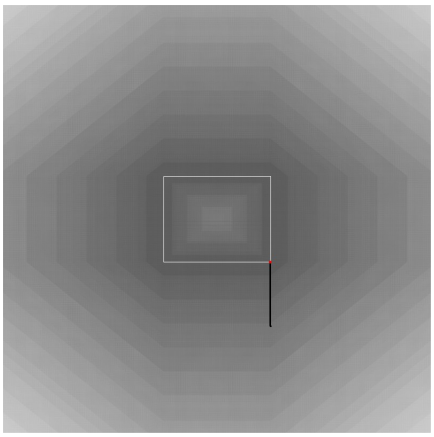

Figure 8: Rect with initial guess at an outside point $(500, 600)$

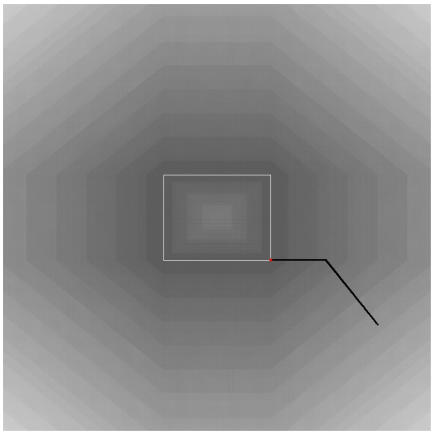

Figure 9: Rect with initial guess at an outside point $(700, 600)$

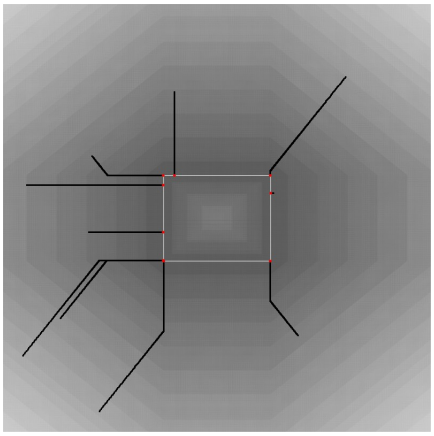

Figure 10: Rect with random points

1.2 3D Cases

1.2.1 Ellipsoid

we choose the input shape as an ellipsoid with $a = 100, b = 80, c = 60$. View data.txt for more details.

1.2.2 Sphere

we choose the input shape as a sphere with $r = 100$. View data.txt for more details.

1.2.3 Cube

we choose the input shape as a cube with $a = 100$. View data.txt for more details.

2 Collision Simulation

2.1 Structure

Class RigidBody: it contains data which can depict a rigid body and some methods to set and get those data.
Class Sol: it provides all the methods we need to initialize a rigid body, to take a time step and update all the data.
main: it sets up the simulation system(frame, L, P, etc.)

2.2 Simulation Result

See attachments.