

Report

- Step1. (Line 203-206, 216-217) Read the input and transform the coordinate of the 3D-dots into the form of homogeneous coordinates.
- Step2. (Line 208, 219) Produce the perspective matrix. Calculate the dot products of the perspective matrix and the homogeneous coordinates of the 3D-dots to obtain the new coordinates of the dots in Normalized Device Coordinates (NDC). Clip the 3D-line(segment, actually) determined by the two dots: if both dots are in the $2*2*2$ cube in NDC, do nothing; if one in while the other not, replace the one out of the cube with the intersection of the line and the cube; if both are not in the cube but the line they determine goes through the cube, replace the two dots with the two intersection of the line with cube; if both are not in the cube and the line they determine does not go through the cube, abandon the two dots.
- Step3. (Line 221-222) Calculate the dot products of the inverse of the perspective matrix and the coordinates of the dots in NDC to obtain their coordinates in original world coordinate. Project the two dots onto the image plane, getting the projected 2D-dots coordinates.
- Step4. (Line 224-225) Use Digital Differential Analyzer (DDA) algorithm to draw the line in the window. The code used for drawing the line is partially optimized.

More detailed comments are included in the code.

data.txt:

-0.75 -0.25 -1.3 -0.75 0.75 -1.3

-0.75 0.75 -1.3 0.25 0.75 -1.3

0.25 0.75 -1.3 0.25 -0.25 -1.3

0.25 -0.25 -1.3 -0.75 -0.25 -1.3

-0.75 -0.25 1.3 -0.75 0.75 -0.3

0.25 0.75 -1.3 0.25 -0.25 -1.3

-0.75 -0.25 -1.3 10 10 -1.4

The result of the testcase “data.txt” is as the picture shows:

