CS 553 Scientific Visualization

Project 3:

Point Clouds, Colors, and Range Sliders

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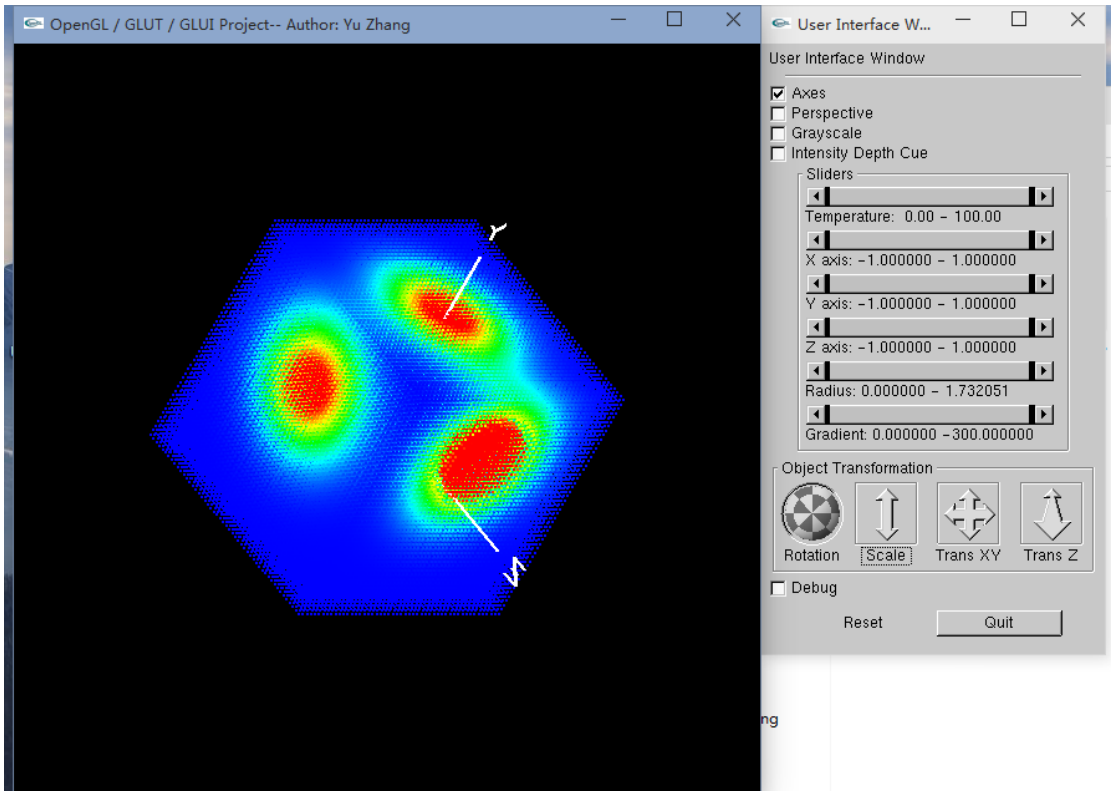
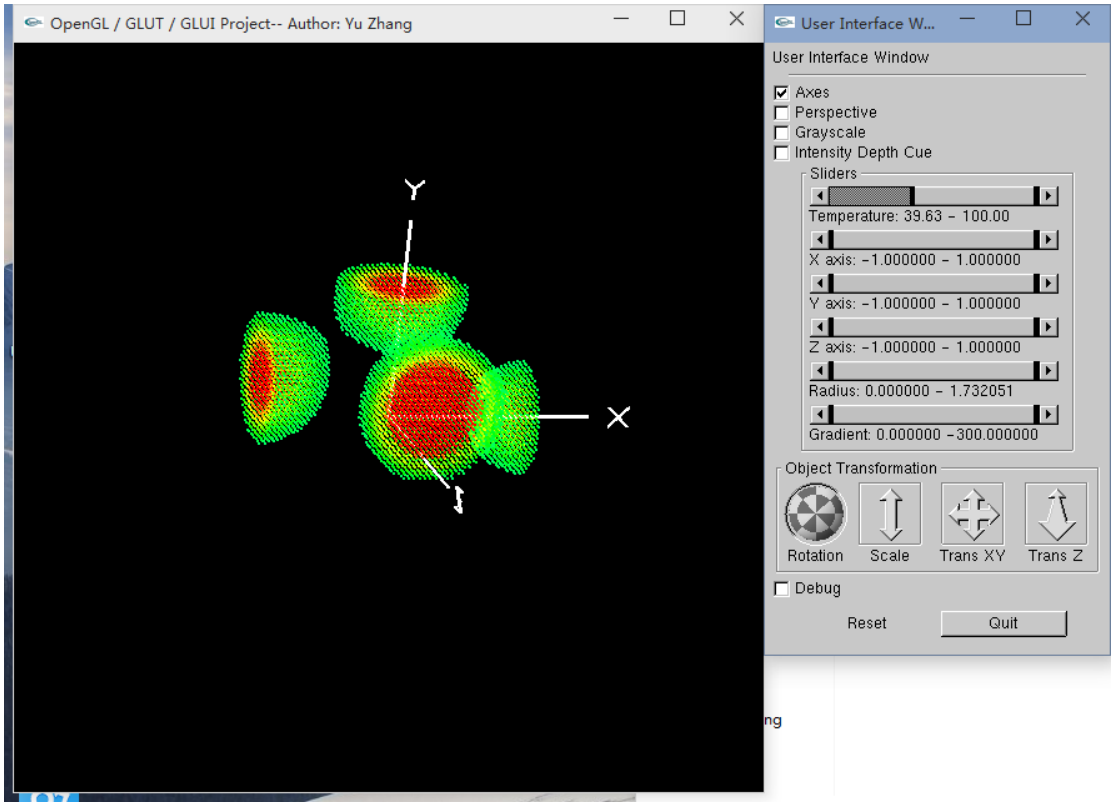
04/14/2015

1. Images of My Project

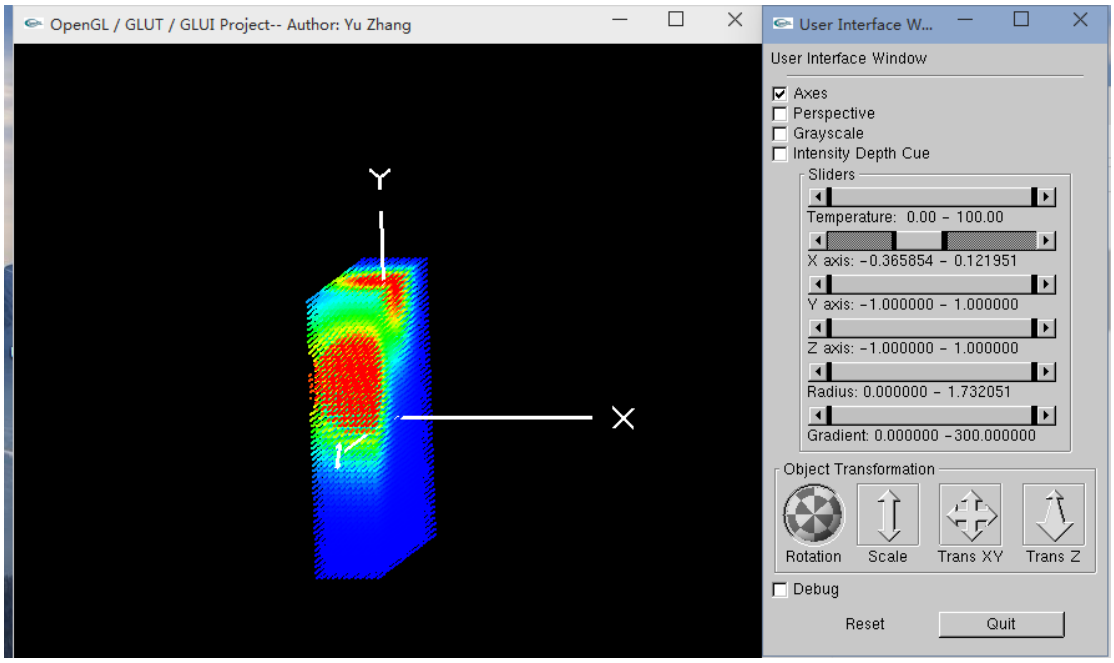
a) The whole program interface:



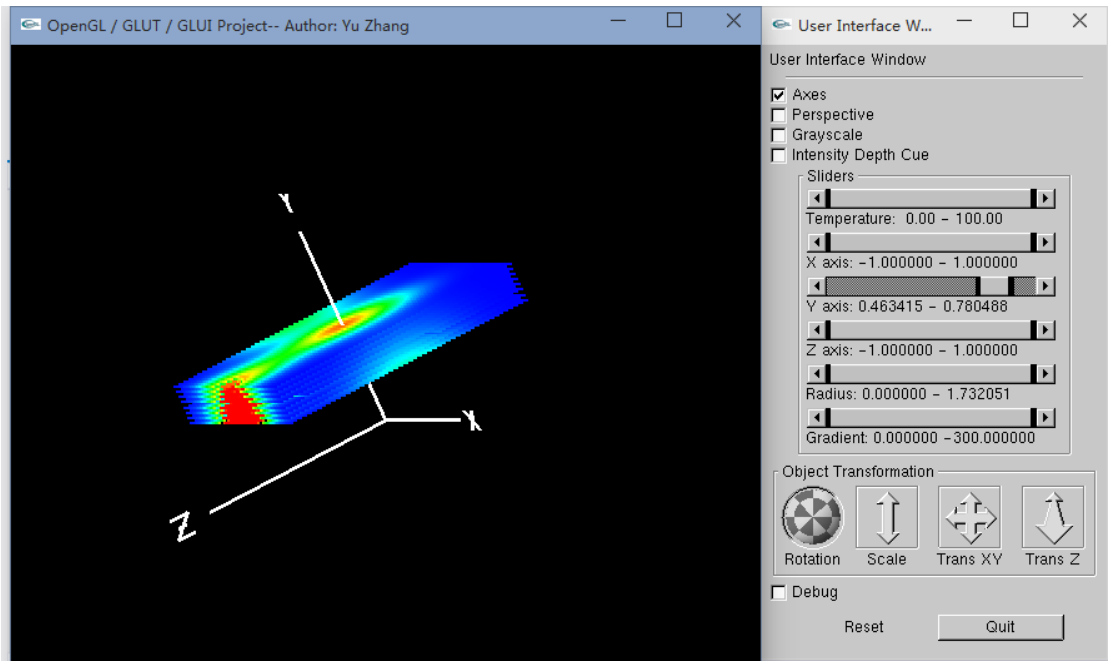
b) Temperature slider:



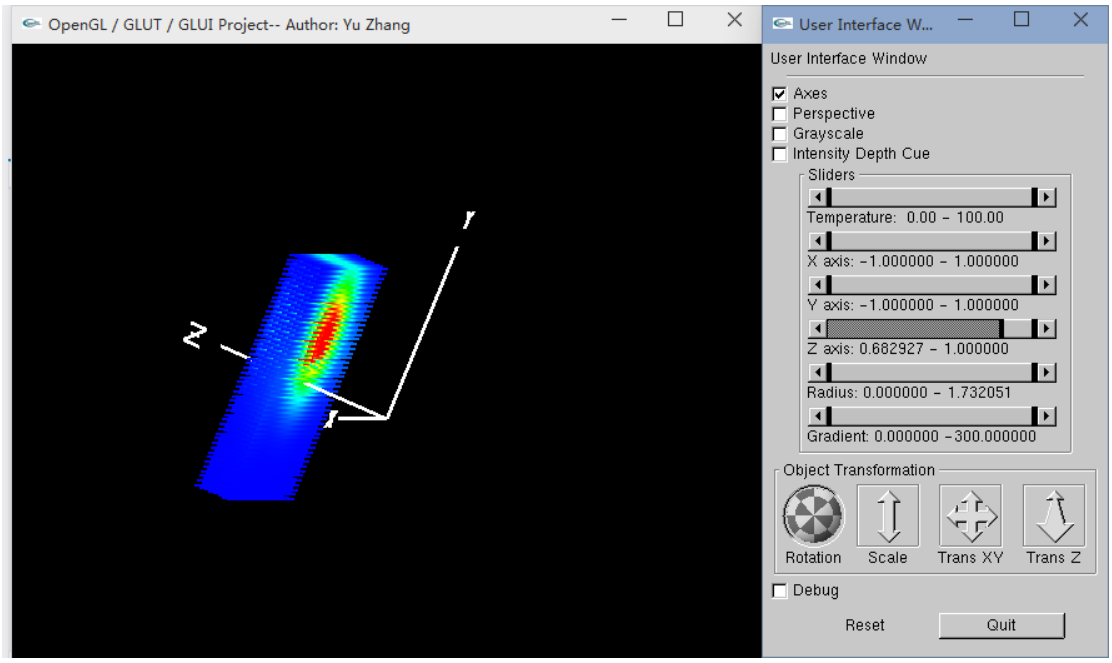
c) X axis slider:



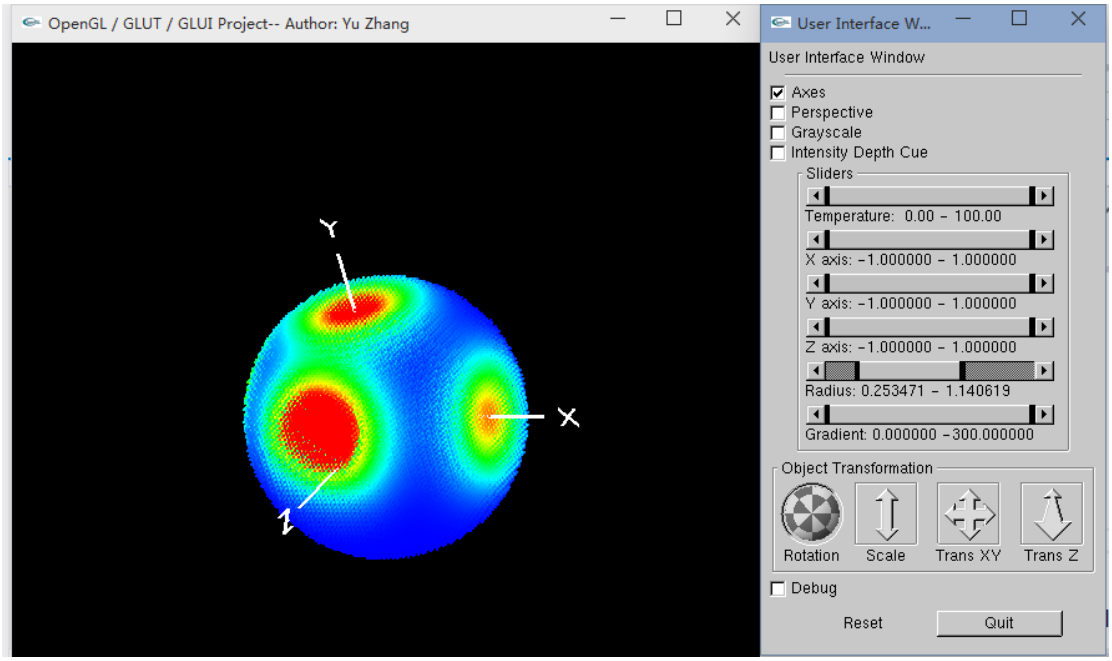
d) Y axis slider:



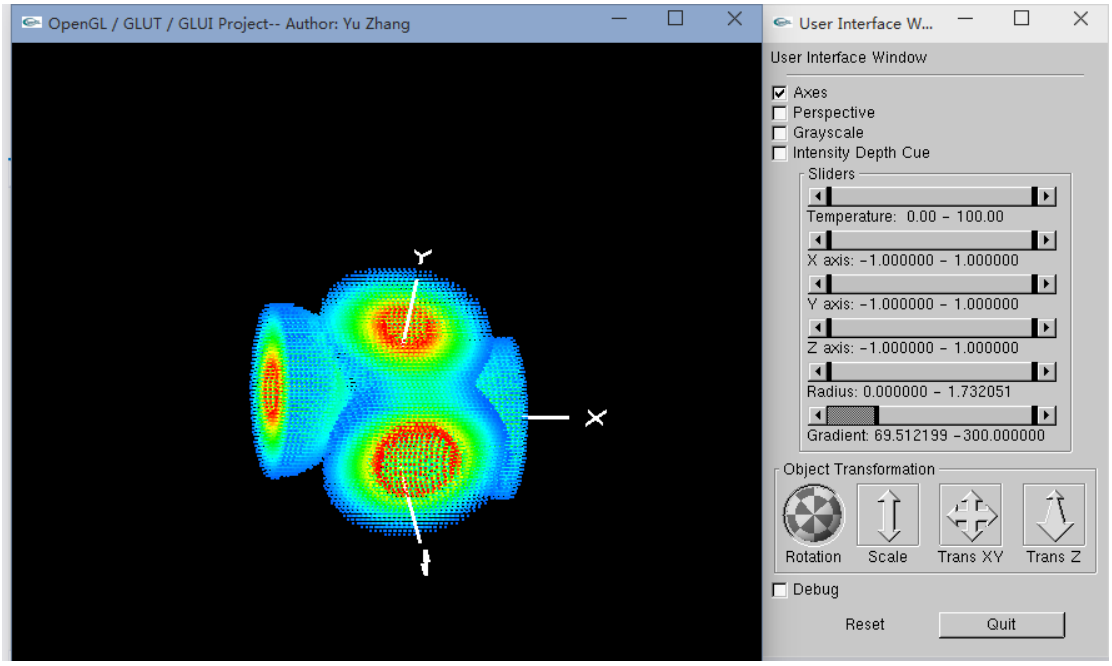
e) Z axis slider:



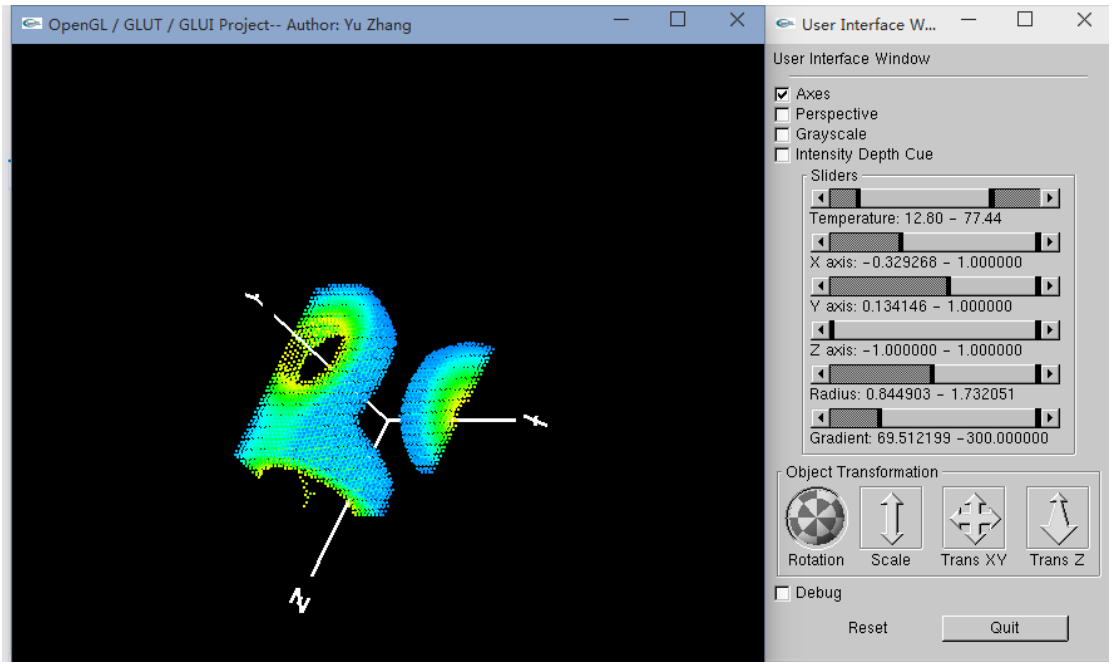
f) Radius slider:



g) Gradient slider:



h) Mix using sliders:



2. Main Points of My Project

a) In project#3, we are required to implement colored graph with more conditions, such as adding sliders and calculating the absolute gradient of temperature at each point.

b) During implementing, there are several main parts need to be considered:

Using a 3D array of structure to store each point's data

Calculating each point's position, temperature, distance from the center of the cube (0.,0.,0.) and the absolute gradient at each

point
Implement GLUI range sliders for select some specific data.

3. **Solutions of My Project**

Most of solutions of this project is shown in the class's webpage, I followed the instruction and most are successful, however I found there are some changes I need to do.

First, to calculate the gradient at each point, I need to use another for loop to calculate the gradient because in the first for loop, we just calculate Nodes[i][j][k].Temperature, but for calculating the gradient, we need to use Nodes[i+1][j][k].Temperature. That is why we need to use another for loop.

Second, for implementing sliders, I found that I have to initialize every properties of point, such as X, Y, Z, radius and gradient. So I did like this, in function InitGraphics(), I add such codes:

```
1040
1041    XaxisLowHigh[0] = -1.f;
1042    XaxisLowHigh[1] = 1.f;
1043    YaxisLowHigh[0] = -1.f;
1044    YaxisLowHigh[1] = 1.f;
1045    ZaxisLowHigh[0] = -1.f;
1046    ZaxisLowHigh[1] = 1.f;
1047    TempLowHigh[0] = 0.f;
1048    TempLowHigh[1] = 100.f;
1049    RadLowHigh[0] = 0.f;
1050    RadLowHigh[1] = sqrt(3.);
1051    GradLowHigh[0] = 0.;
1052    GradLowHigh[1] = 300.f;
1053
```

These codes let me can have an unbroken graph when I run my project.

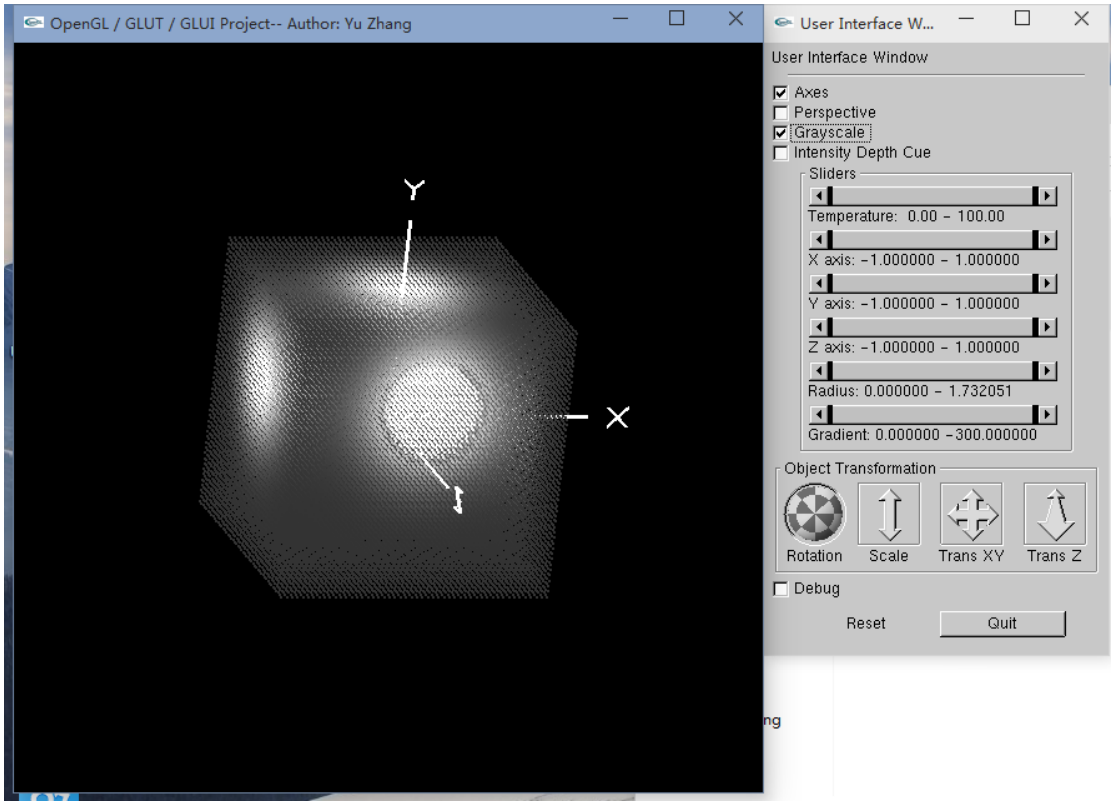
Third, for resetting the graph, I found that the information offered by the class's webpage is not enough, I need to modify the function Reset(), the code is same as the picture showed above.

Forth, there is still one thing that I cannot solve: the sliders cannot be reset. But as our professor said, this problem is because of GLUI, so I just leave this issue.

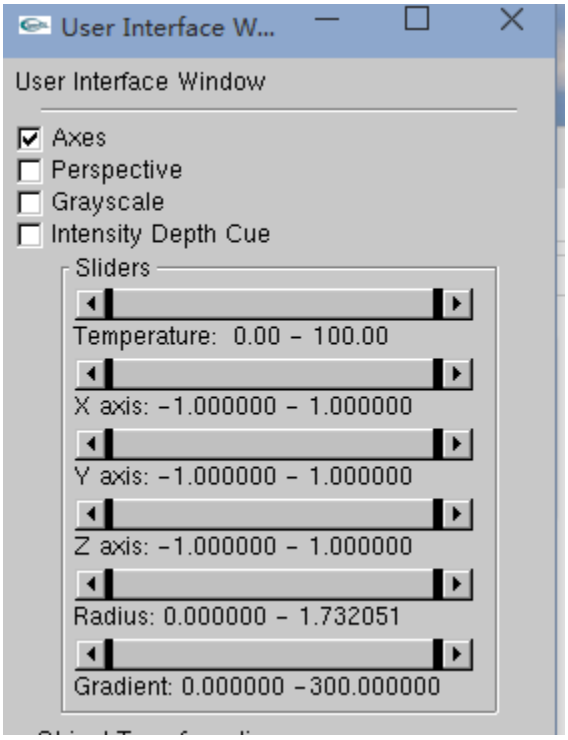
4. **Reflections of My Project**

In this project, I feel OpenGL is really interesting, and I started to learn more about OpenGL. In this project, since I want to add the contents that I did in the project 2 and make the interface more convenient, I added two functions which are "grayscale button" and a "panel for sliders"(as showed below).

a) Grayscale Button and its effect:



b) The panel Sliders effect:



I found this is a useful way for me to get a better understanding about OpenGL and GLUI's function. I will keep studying more funny things about this.