

CS411 – Report 4

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Writing Questions:

Writing Questions answer should in “/data/Chengxi_Shi_CS411_Assignment 5.pdf”

Coding Questions:

All function implements should in file “cs411-assignment5-template.js”

Summary for program design:

Caused by the skeleton code, the things we need to finish is implementing the seven buttons and a smooth function.

1. Turn Buttons

For bunch turning buttons, they should have the similarity. Actually, they are doing changes on the mvMatrix, which means if we want a turn up rotation, we can use mvMatrix.multiply(curRot) to get the new location. However, we will mention that it has some disconnect for each clicking, which means we need to clean all the things for previous changing first before we do the current changing. To fix it, we will use curRot.setIdentity() to clean all the previous one;

2. Zoom in/out

For zoom button, it is actually changing the distance for the camera, which is camZ. To adapt the change for each clicking, we should update the pMatrix. PMatrix is the common interface for both the 2D and 3D matrix classes in Processing. We will use pMatrix.translate(0,0,camZ) to update the new camZ.

3. Invert normal

For inverting, we just need to change the sign for the normal to get the invert direction. For example, model.arrays.normals[i*3+0] = model.arrays.normals[i*3+0]*(-1).

4. Smooth

Get suggestion from classmates, we mention that there are bunch of duplicates for the `model.arrays.normals`, which implies the sharing face normals. We want to get an average for these duplicates and resign it back to the face normal so that we then have a smooth function.

Questions faced and solution:

Writing part:

1. Wrong result in question two

A: it should write as the matrix first, then point, but not point first and then matrix.

Should not forget in the following studies

2. Orthographic matrix calculation

A: it is projecting the point onto the image which preserving with z-axis, where z should keep the same value. Then, using identity 4x4 matrix as the orthographic matrix to get the answer.

3. Parallel matrix calculation

A: it can using α and φ to calculate the parallel projection originally, or using the shear function instead. Here we have only way to use shear function to calculate the matrix by DOP. By using DOP, we can get the a and b parameter for shear functions, which can give us the final result.

Coding part:

1. How to fix the turning buttons?

A: it is using the previous data when we are using `turnLeft` after `turnRight`, which means we need to clear the previous data for each click on the turning button. We can use `curRot.setIdentity()` to clean the track.

2. Zoom out does not work correctly after Zoom in

A: because translate a positive `camZ` does not make sense. To fix it, we need to use the negative `camZ` so that we now have a Zoom out button correctly.

3. Invert normal does not work after set all normal to the opposite direction(which is

times -1)

A: To make the object adapt the new normal, we need to use `assignVertexBuffersData(gl, buffers, model)` to update all of the normal. (the debugging is trying to check the `a_Normals` with -1 in the VSHADER)