CS475/CS675
Computer Graphics

Assignment 2

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Introduction

Aim of the assignment is to simulate the Modeling-Viewing pipeline of OpenGL. The target objects are the models created in Assignment 1.

Code Structure

An array of VAOs and VBOs is created for handling all the models given in the scene file, such that each model has its own VAO and VBO. The complete model is read and stored in the VBOs. Separate VAO and VBO are made for drawing the eye, the projectors and for drawing the part of the near-plane and far-plane inside the frustum. Two vertex shaders are used, one for drawing the grid and one for all the models and the frustum. All the transformation matrices are constructed within the `initMatrices()` function in the `assignment_02.cpp` file. The matrices are calculated in the program and also most of the multiplication is done in the c++ program, only some multiplications are performed in the vertex shader. The models appear same in the CCS and NDCS, since the divide by the last co-ordinate is already handled while displaying the model to the window in case of CCS. The grid is also transformed through the different co-ordinate system to understand the overall effect of the transformations.

Results

We placed the near and far plane infront of and behind the models respectively, with the eye at the corner of the grid opposite to origin, and the lookout point is the origin. The images of the model in different co-ordinate systems through the pipeline are given below.

References

1. Format/Boilerplate code taken from the tutorial `02_colorcube` of course CS675/475 by Prof. Parag Chaudhuri.

2. Functionality for grid rotation adapted from the tutorial `03_colorcube_rotate` of course CS675/475 by Prof. Parag Chaudhuri.

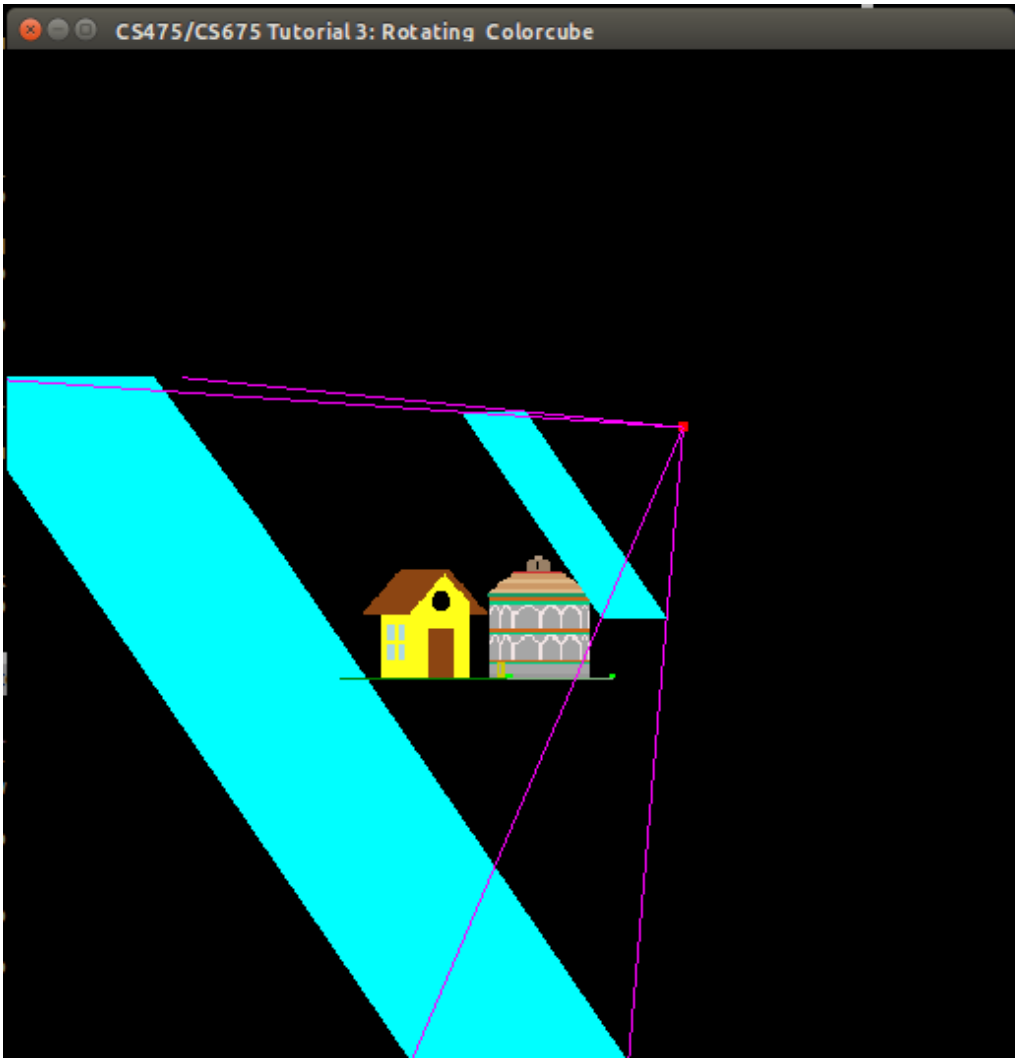

Figure 1: Models in the WCS.

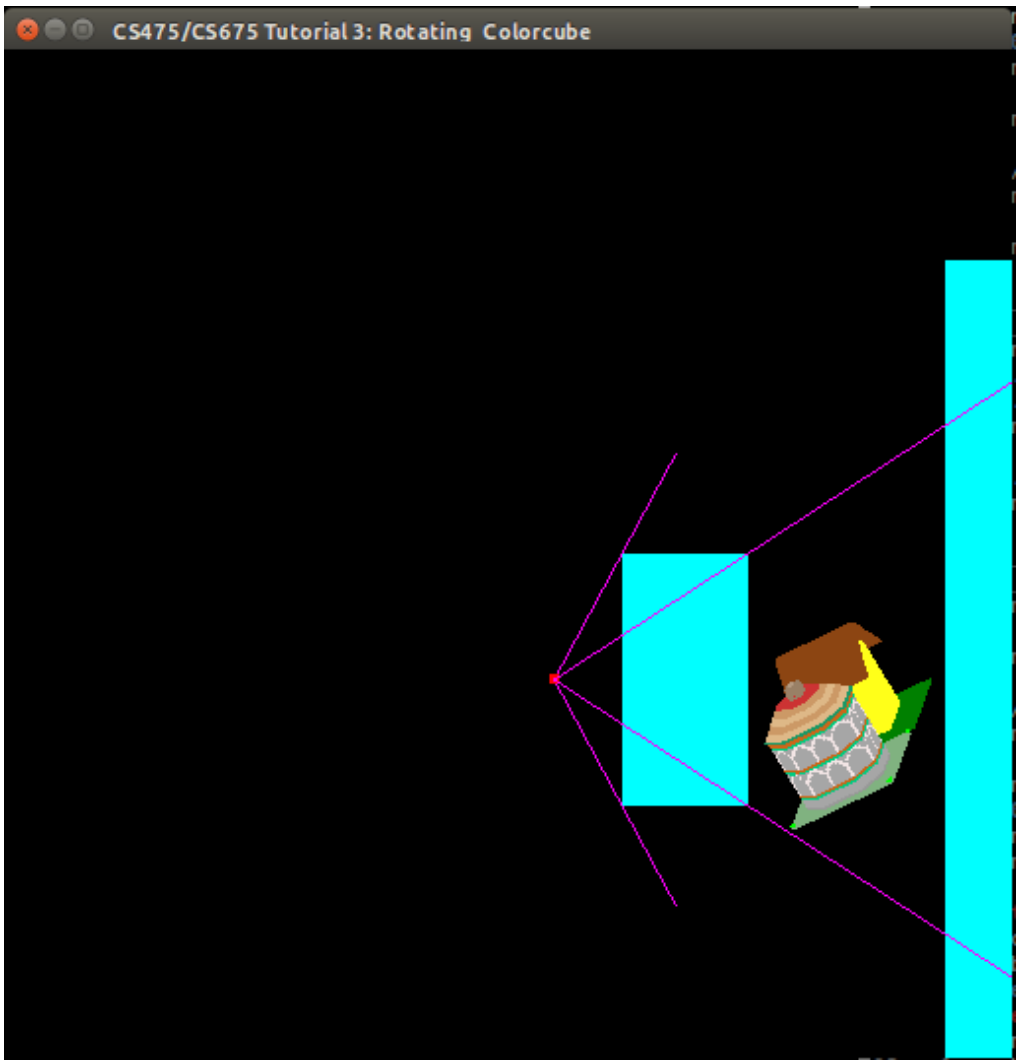

Figure 2: Models in the VCS

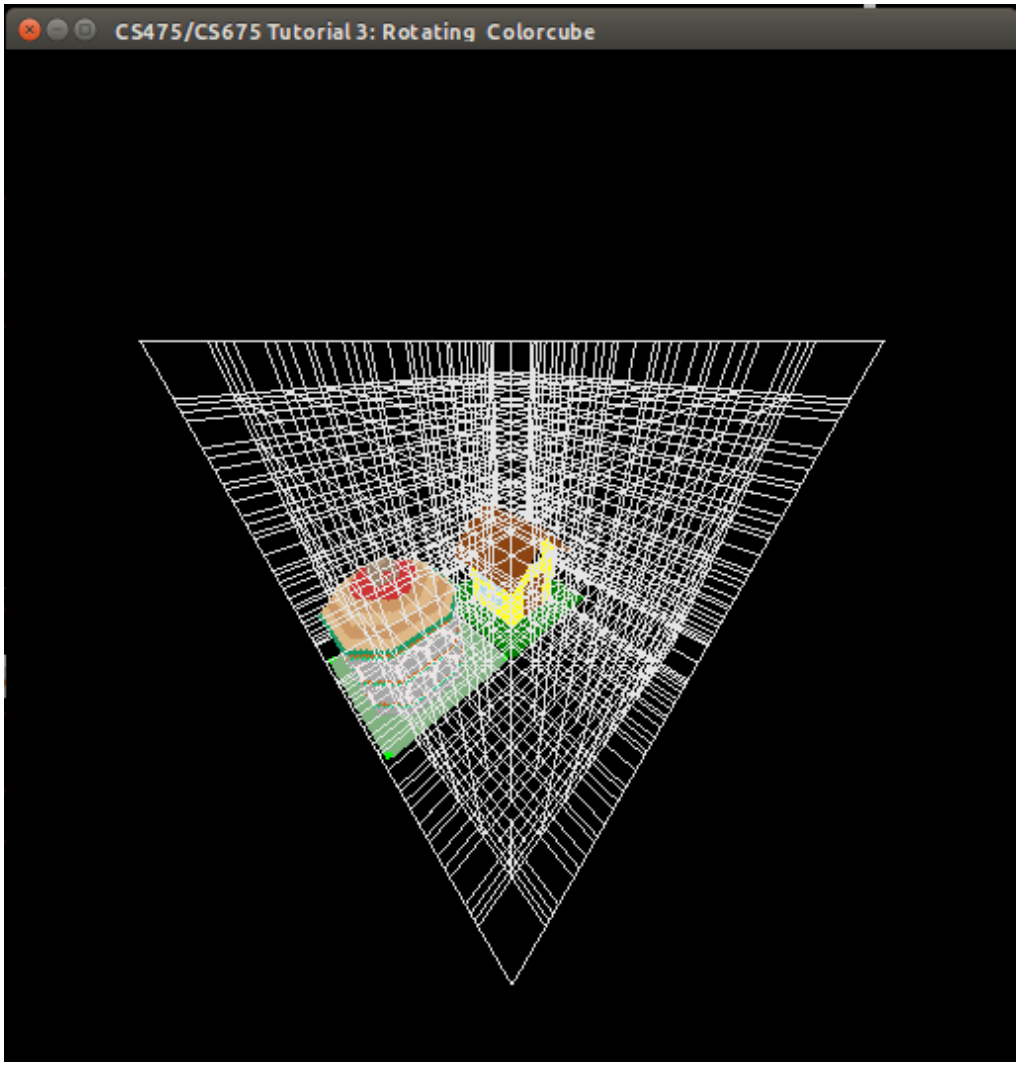

Figure 3: Models in the CCS

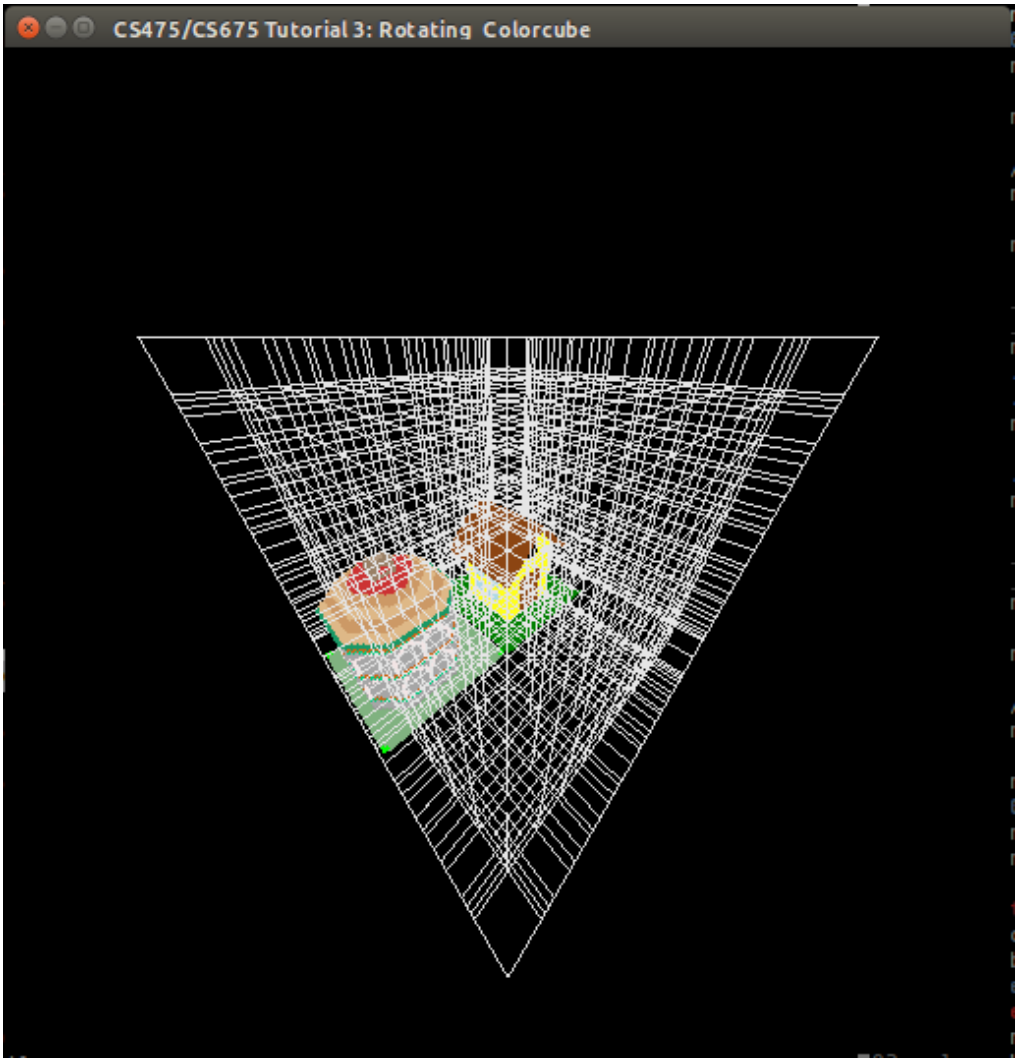

Figure 4: Models in the NDCS

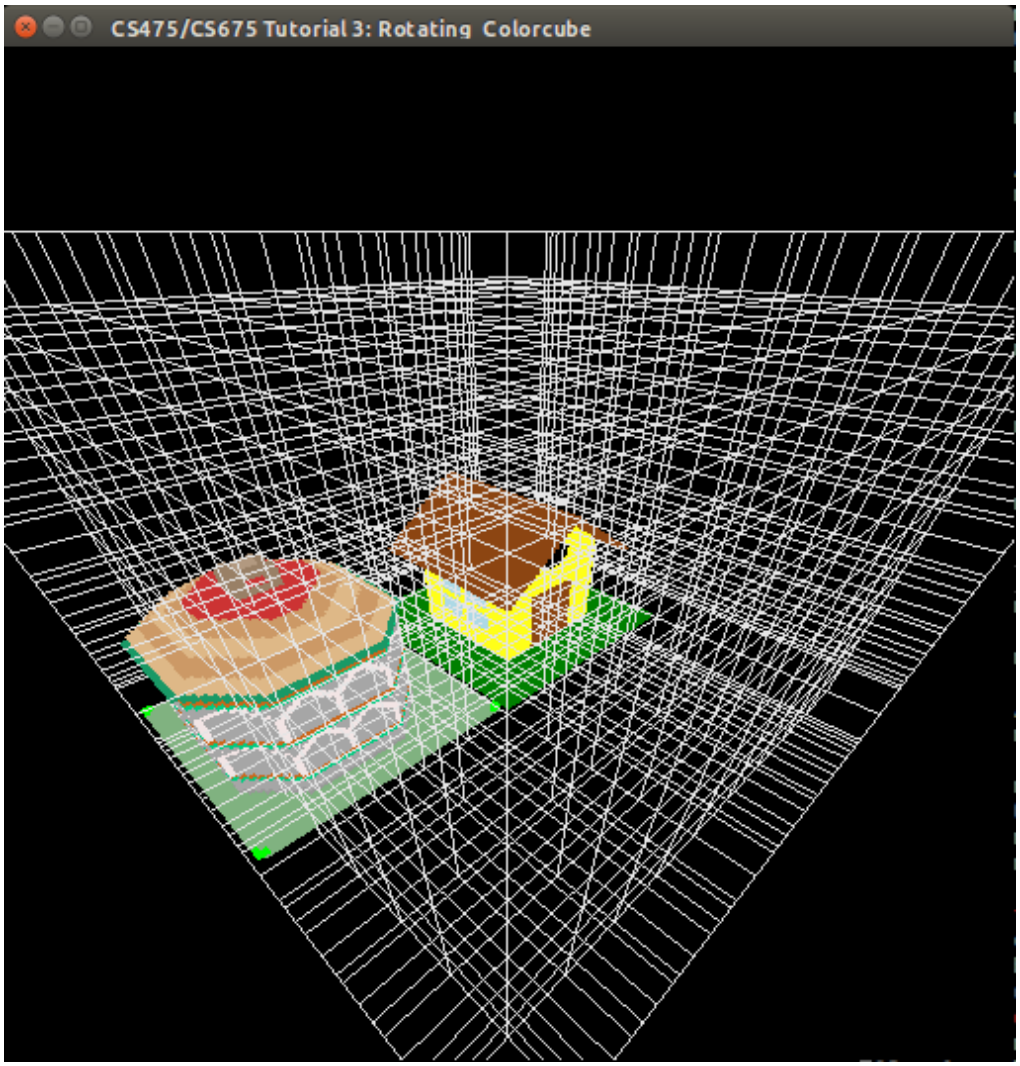

Figure 5: Models in the DCS