CSC305 Assignment Two
Due Date: 24 February 2018

February 2018

1 Introduction

This assignment is designed to make you familiar with the most widely used technique to represent 3D surfaces in computer graphics, i.e. triangle meshes. A triangle mesh is a collection of 3D triangles which are connected to form a seamless surface. In this assignment, the basic requirements is to approximate the triangle meshes of a few simple surfaces such as a cube, sphere and cylinder, texture the mesh and render the corresponding rasterized images.

You would be using indexed triangle meshes (covered in Lecture 9) as the data structure for all subsequent processing. The core requirements are given.

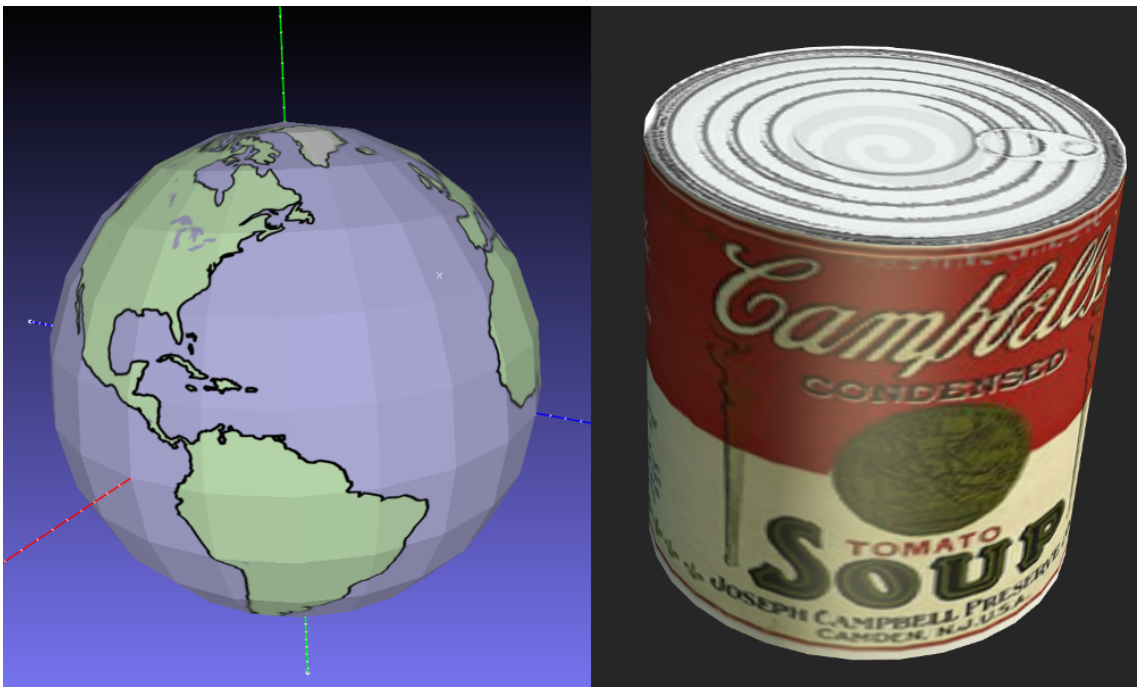

Figure 1: Textured triangle meshes of a sphere and cylinder. Cornell CS 4620.

1.1 Core Functionality (80%)

The program compiles and accomplishes the following:

- Generates triangle meshes from simple primitive shapes (cubes, spheres, and cylinders)
- Write the meshes to a file format such as .OBJ or .OFF
- Reads meshes from .OBJ or .OFF files, and displays them.
- Texture the meshes, and display them. You may use external software such as Blender or MeshLab for displaying the meshes. (Blender is on the lab machines)

1.2 Advanced Functionality (15% - 65%)

- **UI:** Create a UI for when displaying the triangle mesh. Use ImGui to create a menu bar with drop-down menus. (15%)
- **Shading:** Render the images with polygonal shading (Flat, Gouraud, Phong) (15%)
- Generate and display the textured meshes of other primitives such as a torus (15%)
- Use ImGuizmo to do affine transformations (rotate, translate and scale) on the triangle meshes (20%)

2 Grading

Note: During grading you are expected to download your submitted source code from Connex.

Prepare a short written report of which features you have implemented, and be ready to answer questions.
You are expected to be able to explain your code and how it works.
During grading you will have 3 minutes to show your program and its features to a TA.
The program can be compiled and run on either the ECS354 lab machines or your own machine.
Make sure you are able to do so smoothly before the grading session.

3 Helpful Resources

- Skeleton Code - `https://github.com/arthurfirmino/icg`
- Mesh project from Cornell - `http://www.cs.cornell.edu/courses/cs4620/2017sp/`
- Blender - `https://www.blender.org/`
- MeshLab - `https://www.meshlab.net/`
- ImGui - `https://github.com/ocornut/imgui`
- ImGuizmo - `https://github.com/CedricGuillemet/ImGuizmo`
- OpenGP - `https://github.com/OpenGP/OpenGP`