

CSCI 3090U Assignment One (8% of final grade)

Polygonal Meshes

Due: February 22, 2021 (11:59pm)

This assignment will give you some experience with manipulating and displaying polygonal models. The object to be displayed is the Stanford bunny and it is stored in a standard format called PLY. This is an old file format and the software for reading it is well past its best before date. To make life easier this assignment will use an OBJ version of the model. The conversion from PLY to OBJ wasn't straight forward. The file conversion software that I've found doesn't correctly handle PLY files. For some reason it adds extra information that wasn't in the PLY file. I've hand edited the OBJ file to make it closer to correct. I then made a one line change to `tiny_obj_loader.cc` to deal with the other part of the file conversion that I couldn't correct by hand. You will find the `bunny.obj` file and the modified `tiny_obj_loader.cc` files on Canvas. Note, this model doesn't have normal vectors, it only has vertex positions. You will find that the coordinates in this model are quite small, so you will need to scale them before you can display them.

The first step in this assignment is to read the model and just display the bunny in a solid colour [20 marks]. This shows that you have read and interpreted the model correctly. Note, there are a large number of vertices in this model, so you can't use `GLushort` for the index type, you need to use `GLuint`. Next you need to compute the normal vectors for the model. You can do this by first computing the normal for each polygon [20 marks], and then using these normals to compute an average normal for each vertex [35 marks]. You can use the algorithm presented in class to do this. Once you have computed the normals, display the bunny using lighting similar to what we have done in the laboratories and examples [15 marks].

Note that in these models the Y axis is up, so you will need to change the viewing transformations in order to display them correctly. Rotate the bunny about the vertical axis to show the complete model [10 marks].

Include screen shots, source code, and a discussion in your answer.

General Assignment Guidelines

Individual Work

This is an individual assignment. While you may discuss your progress with your classmates, each member of the class is expected to hand in their own work.

In this course, you MAY NOT review, copy or otherwise use any graded academic assignments from prior semesters or other sections of this course, in written, electronic, or verbal form, used in whole or part, including formatting of any assignment.

Report Formatting

Please hand in the following with every assignment in this course:

- A written report (PDF only) describing your solution, highlighting any features of your source code which you would like to bring to the instructor's attention, describing any known problems, answering any questions posed in the assignment handout, and confirming the academic integrity statement. This report should be well-formatted, clearly organized, and use correct grammar and spelling.
- Source code along with build instructions. If you used Visual Studio include the solution and project files. If you used Linux include a make file. Don't include the executable version of your program or other large files. We already have the bunny model, you don't need to include it.
- Images you produce should be embedded in your report. Keep a high resolution copy available in case it is requested for clarification.