COSC 4450/5450 Computer Graphics – Project 4 (last project) –

Timeline: Bonus if submit by Monday December 10, 2018 at 11:59pm; Due NO LATER than Tuesday December 11, 2018 at 11:59pm.

Objective: To understand more about application of computer graphics concepts that we have learned. Application areas to choose from are scientific visualization, information visualization, advanced rendering/shading, or gaming. This is your chance to get creative and fun while applying what you have learned or learning something new in the process. These choices are specifically made vague enough for you to craft your own adventure. If you have any questions about what would be appropriate or not, please email me, talk to me in person, or post on Piazza. They should be scaled to be accomplished in the time provided.

*Choose **ONE** of the following:*

1) **Scientific Visualization:** Use a dataset that is inherently 3-dimensional and render that dataset using volume rendering. For example, CT or MRI or Lidar data. You may use any dataset you prefer. You can use pure OpenGL + Glut or Unity3D to implement your solution. Use a 3D environment in perspective projection. Typically in this type of visualization the data is plotting based on actual 3D position values (may need to scale the coordinate system of the dataset up or down) and render each data point as something. You can choose ONE or more of the following: a billboard/sprite of a color that may represent a component of the data, non-photorealistic rendering (where you can use lines, points, or brush strokes to represent stylistically each dataset), a surface mesh generated from the points of the dataset, or a texture (pixel block from a image- typically used for Lidar data). Some visual examples of these types of visualization will be provided to you either in class or on Piazza.

2) **Information Visualization:** Use any dataset with multiple attributes, that may not be inherently 3-dimensional. For example, a dataset with time, word usage, metadata, relationships between concepts, etc. You can use pure OpenGL + Glut or Unity3D to implement your solution. Your solution can be in 2D or 3D (orthographic or perspective). Typically in this type of visualization you can creatively visually represent the data points and/or relationships between them. Choose the shape of objects, characteristics of those objects may represent other attributes of the data (for example, size may represent one attribute and color may represent another attribute), relationships may be represented by straight or curled lines between the points, etc. Some visual examples of these types of visualization will be provided to you either in class or on Piazza.

3) **Shading:** So far, we have implemented Phong shading model. Either implement another shading algorithm in your existing ray tracer program or use an advanced Shader within Unity. Your environment should include several lights and objects to demonstrate how the Shader is combining colors. You may use a similar object set up as our ray tracer but are not required to. Choose any existing shader beyond a simple Phong or Smooth shader.

4) **Gaming:** Create a fun 2D or 3D original game using only OpenGL + GLUT, putting into practice what you have learned about the rendering event loop and rendering objects. One example of a 2D game is an interactive fish game. The fish objects that (translate) move left and right on the screen based on key input, objects (translate) down the screen that represent food. You need to move your fish to intersect with the food and eat it. The fish (scales) grows larger for each food eaten and points are earned. However, you can design your own 2D or 3D game. I provided this example as one that you could do if you could not think of any or as an example of simplicity in scope, focusing on transformations. You could pick one graphics topic focal area and design a game around that.