Introduction to Computer Graphics
Assessed Coursework 1

Description:

In this assignment you will be provided with a 3D model of a human face (**face.vtk**) and texture image (**face.ppm**). You'll be required to load the textured model in a lighted scene, perform smooth Gouraud shading, manipulate the model, the lights and the camera.

Requirements:

1. Scene setup
   - Draw horizontal plane
   - Draw a cube over the plane
   - Insert 2 Omni light sources in different positions above the plane
2. Model loading
   - Read the VTK and the PPM files
   - Draw the **textured** face model exactly above the cube
3. Smooth shading
   - Produce smooth (Gouraud -> Average of normals around polygon) shading for visualizing a polygonal model of a face with texture mapping applied
4. Model manipulation:
   - Assign Keyboard shortcuts to move the loaded model in 3 axes back and forth
5. Light Control
   - Assign Keyboard shortcut keys for enabling/disabling each light source
6. Camera Manipulation: (using mouse)
   - Rotation
   - Zooming
   - Panning
7. **BONUS**: visualize normal vectors at each point in the model

VTK File:

The (**face.vtk**) consists of following sections:

- Header: file info
- POINTS: number of points (number of vertices of the surface model) and point data type to indicate the start of the vertex data. Each of the following lines contains the x, y and z world-coordinates for each vertex as floating point numbers.
- POLYGONS: the number of polygons and the size of the cell list for all polygons. Each of the following lines contains the number of vertices forming the polygon, followed by the indices of the vertices which form the polygon.
- POINT_DATA: followed by the number of points with texture coordinates.
- TEXTURE_COORDINATES: to indicate the start of the texture data and some misc. information. After that follow lines containing the x and y texture coordinates for each vertex as floating point numbers. The order of the texture coordinates is the same as the order of the vertices.

PPM File:

For texture mapping, the **(face.ppm)** is a **512x512** texture map of the face model. The texture map is represented as PPM file with a short ascii header followed by the **R** (red), **G** (green) and **B** (blue) components for each pixel as a separate unsigned byte.