

3D visualization with OpenGL

GI31 Visualization Coursework 2 (2011-12)

NB: This coursework is FORMATIVE. It does not count towards your final module grade, but you are STRONGLY advised to take it seriously and submit a good quality piece of work.

Introduction

The objective of this coursework is to assess your ability to implement a visualization application in OpenGL. The application reads terrain data from a text file and can draw the terrain clipped against a plane of constant X or Y (the up direction is Z).

Your submission will be marked on the Linux PCs in the DEC10 laboratory.

Task

You will be provided with a dataset in the commonly available ASCII .pgm format. The first two characters are always P2 (a magic code for .pgm). Subsequent lines starting with # are comments and are ignored. The 2nd non-comment line gives the dimensions of the image, and the 3rd gives the maximum height value. The remainder of the file lists the height at each point in the dataset - it is common, but not required, for each line to contain a row of the dataset.

Here is an example:

```
P2
# test.pgm
24 7
15
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 3 3 3 3 0 0 7 7 7 7 0 0 11 11 11 11 0 0 15 15 15 15 0
0 3 0 0 0 0 0 7 0 0 0 0 0 11 0 0 0 0 0 15 0 0 15 0
0 3 3 3 0 0 0 7 7 7 0 0 0 11 11 11 0 0 0 15 15 15 15 0
0 3 0 0 0 0 0 7 0 0 0 0 0 11 0 0 0 0 0 15 0 0 0 0
0 3 0 0 0 0 0 7 7 7 7 0 0 11 11 11 11 0 0 15 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

To help you get started, you may wish to adapt your code, or the solution code provided for the OpenGL practicals which includes a trackball interface to rotate a world.

The marks are broken down as follows:

- Read a .pgm file (you could do this by reading lines of text, and parsing each line using the *strtok* function). [5 marks]
- Display the terrain. The heights should be scaled by an appropriate factor (e.g., using *glScale3f*). Lighting and normals should be defined so the shading is smooth. The sides and base of the terrain should be rendered so the whole world appears solid. [10 marks]
- Holding down the 'x' or 'X' keys changes the clipping plane. 'X' moves the plane in one direction in a plane of constant X and 'x' in the other direction. Holding down the 'y' or 'Y' keys does likewise, but for a plane of constant Y axis. [14 marks]
- Pressing the 'r' key resets the application so all of the terrain is drawn. [1 mark]

Submission procedure & deadline

Submit your coursework via SIS, in the School of Computing's intranet. The deadline is 9am, Tue 22 Nov 2011. Late submissions will be penalised in accordance with departmental guidelines.

Roy Ruddle, October 2011