3D Visualization of petroleum data

Exercise 3: Color mapping

Einar Baumann

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1 Setup

As I am using Linux and not Windows, the recommended tutorial was not of much help for getting started. Instead I used a tutorial I found on the OpenGL Wiki [1]. This tutorial recommend that I used *GLX* and *Xlib* to enable displaying OpenGL using the X Window system, which is the default window system for most Linux distributions.

I used the framework laid out in the tutorial (with some tweaking) to build my application, substituting my own OpenGL commands.

I used plain C for the implementation, as it's what I'll have to do for a project in a very similar course I'm taking parallel to this course.

2 Drawing the squares

For drawing the squares, I used a *Vertex Array Object*, which is now the standard way of doing such things, after the `glBegin` / `glEnd` structure was deprecated. A vertex array object encapsulates all of the state needed to specify vertex data, including the format of the vertex data (e.g. quads, triangles, polygons) and the sources for the vertex arrays.

Vertex Buffer Objects were not used, as the program only contains one instance of one object.

3 Color mapping

I used a *Color Array* to map colors onto the squares. The array defining the colors were generated using the scalar algorithm outlined in the course to map the temperatures given for the vertices onto the given colors.

The algorithm relies on a specified set of n colors in a zero-indexed list, as well as knowing the *min* and *max* values in our range. We input this, along with the value s_i that we wish to map, into equation (1Color mappingequation.3.1) to calculate an index i. The index points us to one of the n defined colors.

$$i = n\left(\frac{s_i - min}{max - min}\right) \tag{1}$$

The result of the color mapping is shown in Figures 1A screen-cap of the first of two possible configurations with symmetry along the vertical center line.figure.caption.1 and 2A screen-cap of the second of two possible configurations with symmetry along the vertical center line.figure.caption.2.