Computer Graphics

CMPS 373

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Course Project

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Terrain Sculptor

**Introduction:**

The aim of this project is to help us understand the basics of cubemaps, procedural generation, real-time 3D object manipulation and sculpting, and the use of cursors to manipulate in-window objects, by creating a terrain sculptor using GLEW and GLFW, as well as other libraries.

**Project Description:**

The terrain sculptor contains a flat, procedurally generated square plane composed of right triangles (modeling). The sculptor also allows the user to traverse scene where the plane is, to give the user more control in how and where to sculpt (interactivity). Most importantly, the sculptor allows the user to sculpt the plane using the cursor (interactivity), when the mouse’s left button is pressed, the terrain is elevated, while getting depressed when the right button is pressed (animation?). The user can also control the strength of the cursor, depending on what they feel suits their current needs (interactivity), with the size of the cursor changing in real time (animation).

**Technical Details:**

[Add for cursor mapping to 3D please, and the source]

[Add for cubemap please, and the source for that and how you worked with SOIL]

The plane is generated procedurally, taking two inputs: The width of the sides of the plane (float width), and the number of segments per side (int div). As such, a plane with div = 1 has two tris making up one square. The function achieves that using a loop. Using another loop, the indices of the vertices are generated, and using that information the mVertices vector is initialized. The generation function also takes care of generating the texture coordinates.( <https://www.youtube.com/watch?v=FKLbihqDLsg> (temporarily here))

The function used to actively modify the plane does so by looping through all the vertices in mVertices and modifying the y-component of the position based on: The distance between the vertex x- and z-components and the cursor’s position, the strength of the cursor, and whether it should elevate or depress the terrain. The function that determines the amount by which the y-component is modified is called “gaussian(float x)”, which is just an exp(-x2) function. (<https://en.wikipedia.org/wiki/Gaussian_function> (temporarily here))