

CS 480 Senior Project Proposal

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Mimic - A Pseudo-realistic Procedural Map Generator

PURPOSE

For my senior project, I would like to create a pseudo-accurate procedural map generator based off real world processes of geographical formation, for use by story writers, game designers, etc. The hope is that by doing so, the project will be able to generate maps that will retain distinction, even at larger scales, as well as create realistic worlds that users will be able to use in their work, that minimize the need to suspend disbelief at their plausibility to actually exist.

FEATURES

Mimic will generate maps as a, for the first version, 2000 x 2000 grid of tiles, with each tile representing a 5km x 5km area, with each tile containing geographical data for its coordinate that after the map's generation is complete, will be run through an interpreter that will then generate an image of the map as its output.

The generation process, itself, will work by running generators for each feature on the map, over the duration of a number of passes, with each pass representing the passage of time. Each generator will run using parameters defined in specifications for how each should act at a point in time. These specifications, defining the conditions of different geological eons, will also control what generators will be active at a point in time, how generator parameters will change with time, as well as eon duration and order.

Once a map is generated, an interpreter will dictate color information for an images pixels, that will then be passed to an image generator to produce the output. As a fallback, the output image will be a bitmap, but depending on the level of difficulty of their implementation, this may be changed to png, jpeg, or another format, if one better suited to this project is found.

For the minimum viable deliverable, the target goal will be to have a basic UI with a button to generate a map, implement the image interpreter and generator, have working generators for meteor and meteorite impacts, water map generation, and possibly a third for either plate tectonics, erosion, or something else.

Once the project's minimum deliverable is complete, possible stretch goals for this project will include the implementation of more types of generators, creating a more sophisticated UI, creating a geographical information system, that will be able to tell a user about the characteristics of different parts or specific locations of a map, giving users the ability to fully customize geological eons, as well as many others.

TECHNOLOGY

I want to code this project in Rust, utilizing Cargo to implement a GUI crate and the rust-image crate. The project may also attempt to run on a GPU, to help optimize performance. I'm also hoping to somehow incorporate the generation and use of normal maps, for the water map generator.

LEARNING OBJECTIVES

From this project, I hope to gain proficiency in Rust, and familiarity with Cargo, as well as meaningful experience managing big data (with each tile being it's own data point, there will be a minimum of 4,000,000 data points). I also hope to gain an understanding of image data analysis and generation.