

# MGAI Assignment 1 Procedural Content Generation

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## 1 Introduction

In this assignment we want you to familiarize yourself with Procedural Content Generation. It's a fun and varying field. For example there are Minecraft village generation challenges <sup>1</sup>(see Figure 1)



Figure 1: Entry from the Generative Design in Minecraft Challenge (GDMC). This village was constructed algorithmically and not drawn manually. It serves as an example here for what PCG can do.

To do so you will implement a python program generating a colored 2D Map. This blogpost<sup>2</sup> will give you some inspiration how to generate a map containing grass, sand and water (see Figure 2). This only generates a noise map so you will still have to turn this into an Image (PNG or JPG) via Matplotlib or the Python Pillow Library (PIL).

We expect at least **two** additional elements added to the generator. You are free to choose these additional things. If freedom makes you scared that we somehow believe you are not doing enough (by e.g. only adding two different colors and telling us in the report that these should represent "two unique new biomes") below is an example list of unique things that are definitely sufficient

- Different shades within one biome to indicate mountains / height differences

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<sup>1</sup><https://mikecgreenblog.wordpress.com/2018/05/31/the-generative-design-in-minecraft-competition-gdmc/>

<sup>2</sup><https://medium.com/inspired-to-program-%E3%85%82-%D9%88-%CC%91%CC%91/procedural-generation-in-python-7b75127b2f74>

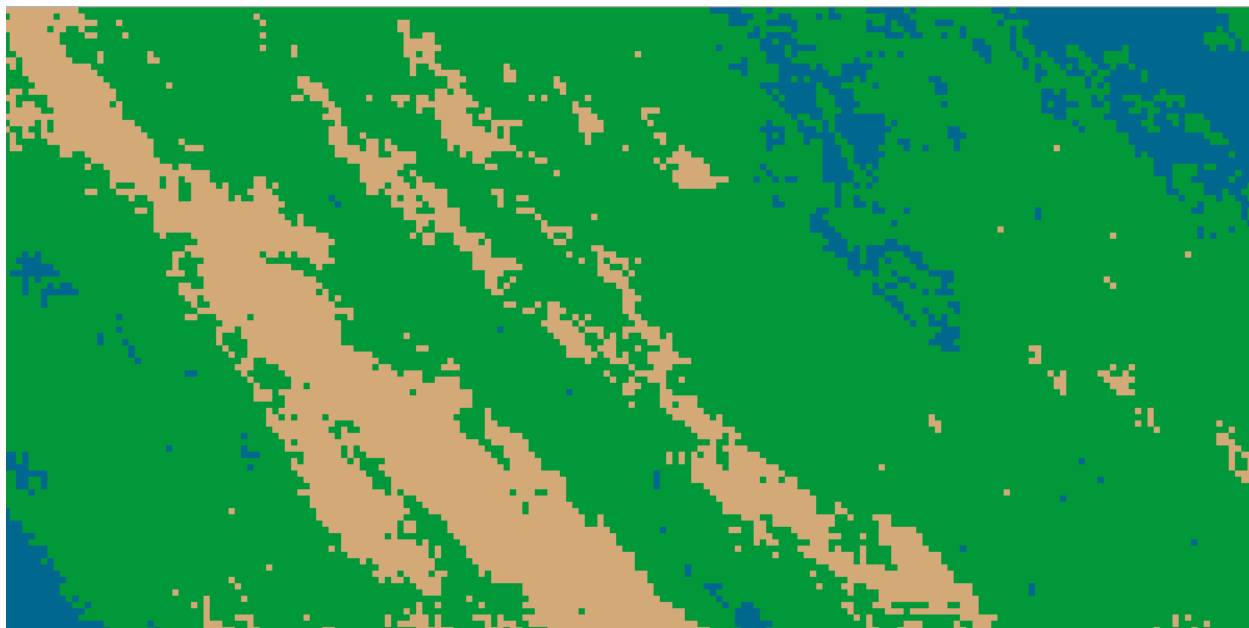


Figure 2: The basic generated map that you are supposed to extend.

- Small different colored rectangles to indicate houses
- Roadways connecting said houses
- Improving the water biome to be more believable or diverse (e.g. rivers, ponds, beaches along waterbeds)

We expect you to attempt to implement these things in a way that the world is believable. Believable in the sense that, e.g., a house should not spawn directly in the middle of an ocean where it would not be reachable. A road from one house to another wouldn't include a large detour into nothingness. Or if you choose mountains then their shape and indicated height differences between pixels should seem realistic.

Please also take into account that some randomness is expected, the result of your program shall not be deterministic, so that it can be used to generate different maps.

## 2 Submission

Make sure to nicely document everything that you do. Your final submission consists of:

- Source code with instructions (e.g., README) that will generate a new map per script execution. The code should be runnable on a university machine booted into Linux (DSLlab or computer lab).
- A self-contained pdf report of 3 to 4 pages, including figures etc. The page amount we expect of you might vary depending on your layout. This report contains an explanation of the techniques you applied, how you addressed believability and overall conclusions.

If you have any questions about this assignment, please visit our lab sessions on Wednesdays where we can help you out. In case you cannot make it, you can post questions about the contents of the course on the Brightspace discussion forums, where other students can also read and reply to your questions.

The deadline for this assignment is the **11.03.2021**.