Foundation Map Generator

1. TLDR

Edit the TerrainObjectList.jsonc. to your hearts contend, execute gen_heightmap and/or gen_assetmaps.

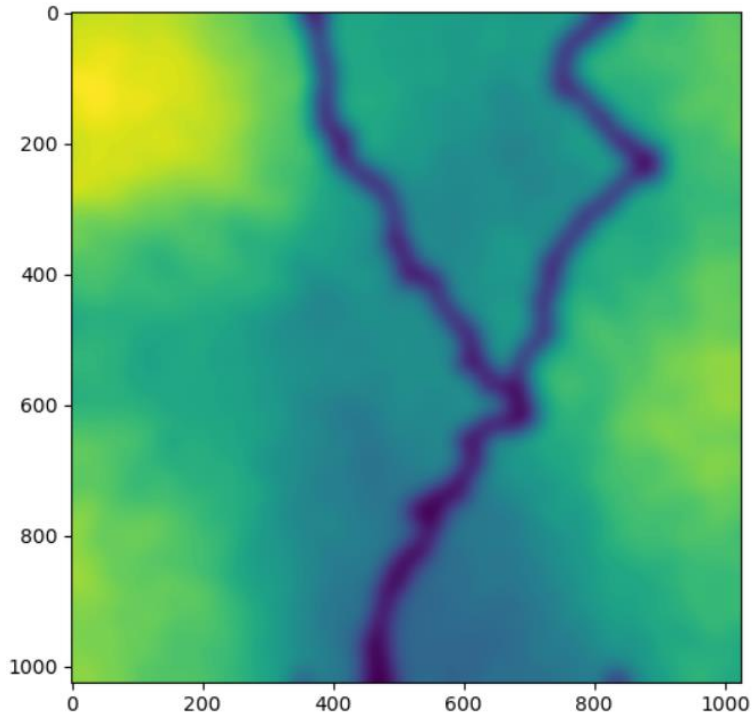
2. What is this program?

The game **Foundation** allows you to create your own custom maps. A map is made up of a grayscale heightmap, and several maps and masks for resource placement. Maybe you already have a great idea, how your map should look like, but you find the process of making all these files by yourself quite challenging and time consuming.

This program is actually two programs. The heightmap generator can generate a heightmap from a list of mountain and river waypoints and the second program can generate all those needed extra maps and masks.

3. How do I generate a Heightmap?

A heightmap is a grayscale image, ranging from 0…255 from black to white. The lighter the dot, the higher the point on the map. The heightmap is 1024x1024 in size. The program contains a file called TerrainObjectList.jsonc. open this file with notepad (or even better with notepad++ or another editor) the you will find all the parameters needed. I will go through each one, but the mountain and river lists, is what I want you to look at first. The lists contain the rivers, mountains and dips (which are mountains with a negative height) each of these has a list of waypoints, representing coordinates on the map. X=0;Y=0 is in the top left corner.



You can add as many Objects to the Lists as you want, with as many waypoints as you like. After all the editing, **double click gen_heightmap shortcut**.

General

```
"map_attributes":{"max_height": 200, "min_height": 55, "river_level": 40, "sigma": 15},
```

The first thing the generator will do, is generate a baseline map, using max height and min height. but the baseline will not actually be that high and low, since the generator will run several smoothening filters on to of that.

River level will be used as the deepest point of the rivers.

Sigma is the radius for the GAUSS smoothening algorithm. It basically represents how many pixels in radius each pixel will be spread.

Rivers

```
"rivers": [
    {
      "attributes":{"width": 1, "deviation": 10,"sigma": 5},
      "waypoints":[
        {"x": 350, "y": 0 },
        {"x": 450, "y": 256 },
        {"x": 700, "y": 600 }
      ]
    },
```

Width is the width of the river (duh)

Deviation tells the river how wild it can go (low deviation will just be straight lines)

Sigma is again for the GAUSS filter to smoothen the edges of the river

Waypoints tells the program where to draw the river (it needs at least 2 waypoints)

Mountains

```
"mountains": [
    {
      "attributes":{"height": 150, "deviation": 150, "density": 20, "sigma": 30},
      "waypoints":[
        {"x": 0,  "y":   0 },
        {"x": 100,  "y": 256 },
        {"x": 156,  "y": 512 },
        {"x": 100,  "y": 700 },
        {"x": 50,  "y": 1024 },
        {"x": 156,  "y": 1050 }
      ]
    },
```

Height is the height of the mountain. If you want a dip or subtract from another mountain, give it a negative height.

Deviation spreads the mountain (its more the width of a mountain, maybe I should rename the parameter)

Density the program seeds dots, each step it goes to the next waypoint. Density determines how many dots are seeded. This is the major performance killing parameter, so be sure to not enter number above 100.

Sigma you guessed right, it's for the Gauss filter, that smoothens those seeded dots to a nice mountain

Waypoints same as rivers, it determines where the mountain range is placed, two waypoints minimum are needed.

4. How do I generate asset maps and masks

```
"map_attributes":{"max_height": 200, "min_height": 55, "river_level": 40, "sigma": 15},
   "deciduous_density_map":{"steepness":2, "sigma":5},
   "coniferous_density_map":{"steepness":1, "sigma":10},
   "densities": {"berries": 5, "stone": 5, "ore": 2, "fish": 20},
   "group_probabilities": {"berries": 5, "stone": 1, "ore": 0, "fish": 1},
```

To run the assetmaps generator, **double click gen_assetmaps shortcut**. Please note, that it only works, if there is a heightmap in the Map folder

From the **map attributes**, the asset map generator will the **max** and **min height** to build filters for the material mask. Min height should be water level. The generator will start a bit above that, so the grass will not grow directly on the water level.

If you skipped the first half of the document: sigma is the radius of the GAUSS filter, that smoothens the edges of the masks and maps

Deciduous density map and **coniferous density map:** these maps are layered by several maks. The first one is the min_mask, that cuts out all the water areas. The second one is a gradient mask, that cuts out all steep areas ~so **steepness** tells the generator how steep the tree free areas should be. The lower the steepness tolerated the less trees will be planted. In the example, less coniferous trees will be planted, because the tolerated steepness is lower. The generator also cuts out all berry bushes and rocks from the tree maps.

Densities: the map is made up of 1.048.576 pixels. A density of 1 means 1/50000 pixels will be a bush, rock etc.

Group_probabilities: bushes sometimes grow in larger groups, the group probability determines, if a placed resource will be a group of ressources by a per cent chance. Berries = 5 would be a 5% probability.

5. Results

All relevant files will be placed in the the Map folder.

However the masks will be placed in the Masks folder. So you can use them for extra editing.

The PartialMaps folder contains all maps of each terrain object. This might be useful to debug, where your mountains, dips and rivers are placed.

6. Disclaimer

I do not own any rights to the game **Foundation** nor am I associated to the **polymorph studios.**

I created this program for fun and my own desire to make maps. I am willing to share my stuff, as I believe in open and free software. But I have no obligations to supply support for this software.