Report virtual world generation

Utilitary

I can export several scalar field from my terrain:

- Slopes

- Occlusion

- Drain

- Derivate (on x and y)

- Laplacian

Here is the results:

Erosion

I implemented the smooth hill erosion and a rain erosion using the equation ...

Civilisation

I used Dijkstra for shortest path computation and geometry graphs for network generation.
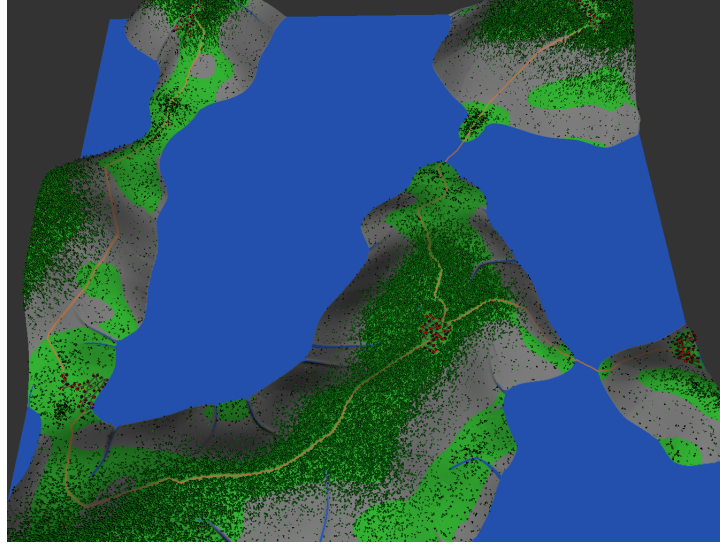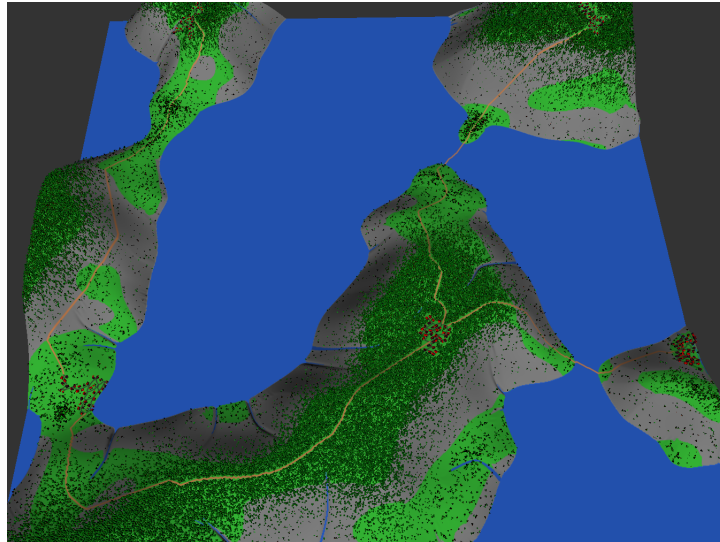
Figure 1: a caption

Figure 2: raw terrain, smoothed terrain and eroded terrain

Roads between cities

Given a set of position (the cities locations), I compute the shortest path between each pair of cities (using Dijkstra algorithm on a weigthed network (weigths are computing depending on the terrain specification (slope, size, water...))) and then, I remove useless path (a path between A and B is useless if, for a fixes real α, there exists another point C such that $|AB|^\alpha > |AC|^\alpha + |CB|^\alpha$). To get a road network linking every cities.

Streets inside cities

To generate cities, I used a Eden growth algorithm to create crossroads. After what, I simply link them together in the same way as I linked cities. Finaly, I walk along each street, adding a house if possible (If the house does not intersect a street or another house, the intersection computation is done using a Bounding Volume Hierarchy to speed up the
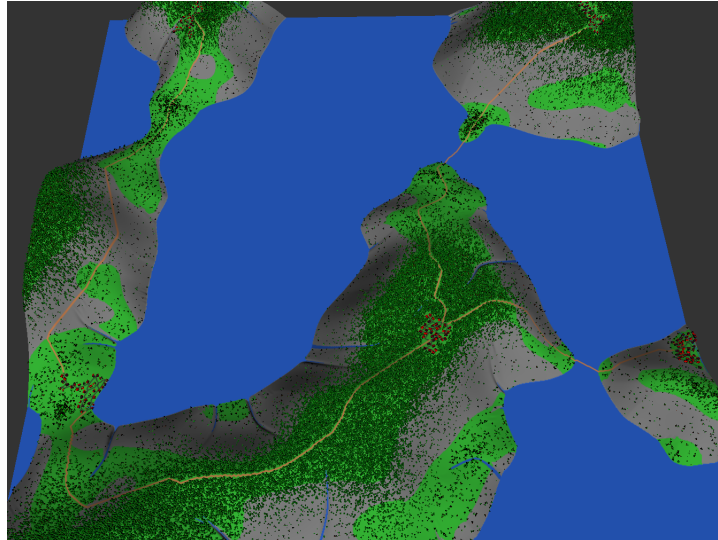
process).

results

Figure 3: raw terrain, smoothed terrain and eroded terrain

Nature

Finaly, I can generate forest of different tree type. In order to do that, I precompute several forest tiles using a drath throwing algorithm. Of course, I make sure that I can put every tile next to each other. Once the set of tile generated, I simply pave the terrain with forest tile and create a tree at each tree location of each tiles.

To create a tree, I compute a probability of creation for every tree types. Then I draw a random number for each tree types to know if it can be created or not.

- If no tree is created, I do nothing

- if one tree type can be created, I create it (instanciate the tree model with a random size proportional to the probability of creation)

- If more than two tree can be created, I select one tree type randomly (see ANEXES).

Anexes

TODO