Fractals, noise and agents with applications to landscapes

Based on pcgbook.com, chapter 4

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Introduction

Terrains and Landscapes

- different roles (aesthetic vs. functional)
- different size and detail requirements

The Witcher III
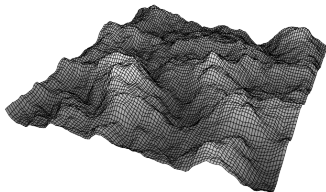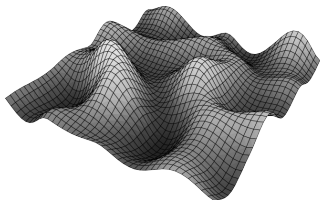
Height / Intensity maps

- Common form of representations for terrain

- Two-dimensional matrices of real numbers

- Interpretation (interchangeable)
    - intensity: brightness of pixels (noise)
    - height: height of pixels in map (terrain)

- Interpolation

- Alternative: Voxel representation (caves, etc.)
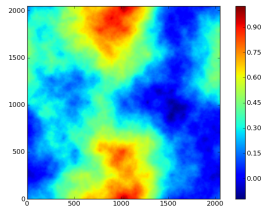

joecrossdevelopment.wordpress.com

Creation via Perlin Noise

- Simple Example Script:
  `http://wiki.unity3d.com/index.php/TerrainPerlinNoise`

- With heights: `https://forum.unity.com/threads/`
  `perlin-noise-based-terrain-hill-generator-working-script.`
  `214701/`

- Fractal noise:
 `https://github.com/RobertStivanson/unity-diamond-square`

scratchapixel.com

Doran and Parberry's algorithm[1]

- Coastline: Outline and shape of terrain
- Landform: Terrain features
- Erosion: Rivers
- Description:
  http://pcgbook.com/wp-content/uploads/chapter04.pdf, pages 65-67

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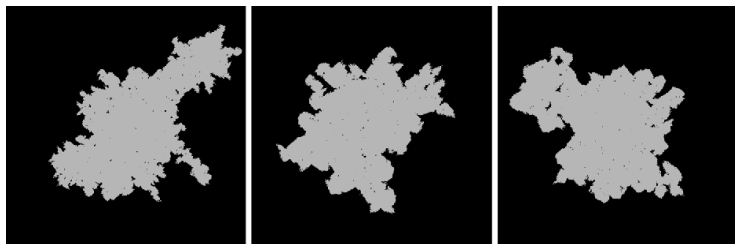
[1]Doran, J., Parberry, I.: Controlled procedural terrain generation using software agents. IEEE Transactions on Computational Intelligence and AI in Games 2 (2), 111–119 (2010)

Doran and Parberry's algorithm[2]
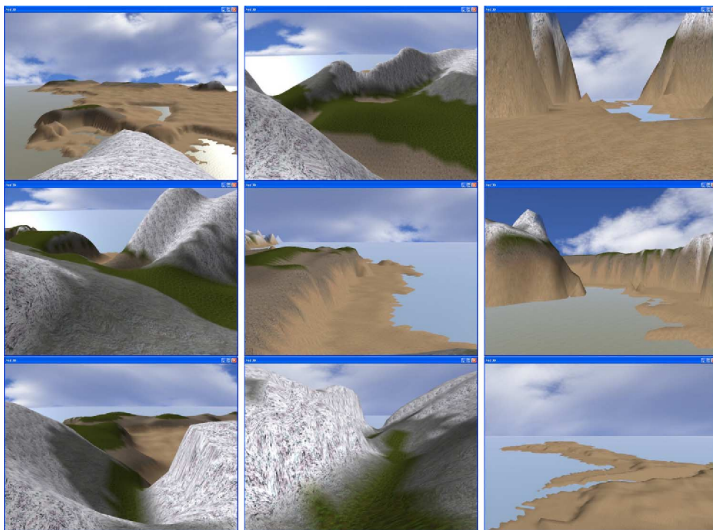
[2]Doran, J., Parberry, I.: Controlled procedural terrain generation using software agents. IEEE Transactions on Computational Intelligence and AI in Games 2 (2), 111–119 (2010)

Exercise suggestions

1 Use fractal noise generator and
- add vegetation, water, different colours
- implement mechanism for generating more detail only when needed

2 Implement Doran and Parberry's terrain generation algorithm in Unity

3 Continue on Minecraft Settlement (including submission on June 30th), Minecraft Map Generation with fractal noise afterwards (Brownian motion, Perlin noise)