

Procedural generation

Random generation

the game will build the content on predefined elements that the developer hard coded

Josh Byer (Gamasutra)



Example: Dungeon of Isaac

Predefined rooms, monsters, ...

Starting room, for every wall a random values determines if another room is adjacent, if yes then place a random room, beside the starting room.

Repeat until all walls of every room is checked or predefined max room number is hit.

Procedural generation

the game itself will create original content for the player to explore or use

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Example: Minecraft

Use a seed and generate with a noise function a pseudo random terrain, characteristics or placement of game elements.

Two examples simplified

Perlin Noise	Wave function collapse
<p>Use a random starting seed, input it into perlin noise algorithm</p> <p>→ Returns 2D/3D noise map</p> <p>Noise values can be used as a height map 2D, point cloud for marching cubes 3D or to determine characteristics of cells/voxels (example: what block should be placed e.g Minecraft)</p>	<p>Predefined set of elements and rules for them. Example: water tile, sand tile, grassland tile.</p> <p>Generate grid, choose random starting point, choose seed value or random value as entropy(amount of possible states of the cell) for the starting cell, place tile, choose the cell with the lowest entropy for the next step. Repeat.</p>

Sources:

Explanation/examples for wave func. collapse: <https://github.com/mxgmn/WaveFunctionCollapse>

Explanation/examples for wave func. collapse: <https://adrianb.io/2014/08/09/perlinnoise.html>

Explanation of algorithm and usecases: <https://youtu.be/zIRTOgfsjI0>

procedural generation

basics in 5min

random generation vs procedural generation

the game will build the content on predefined elements that the developer hard coded

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the game itself will create original content for the player to explore or use

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Why?

infinite gameplay content

+

replay potential

+

eliminate repetition

+

controlled environment

How?

seed

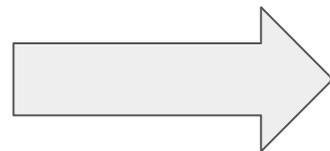
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noise generator/perlin noise

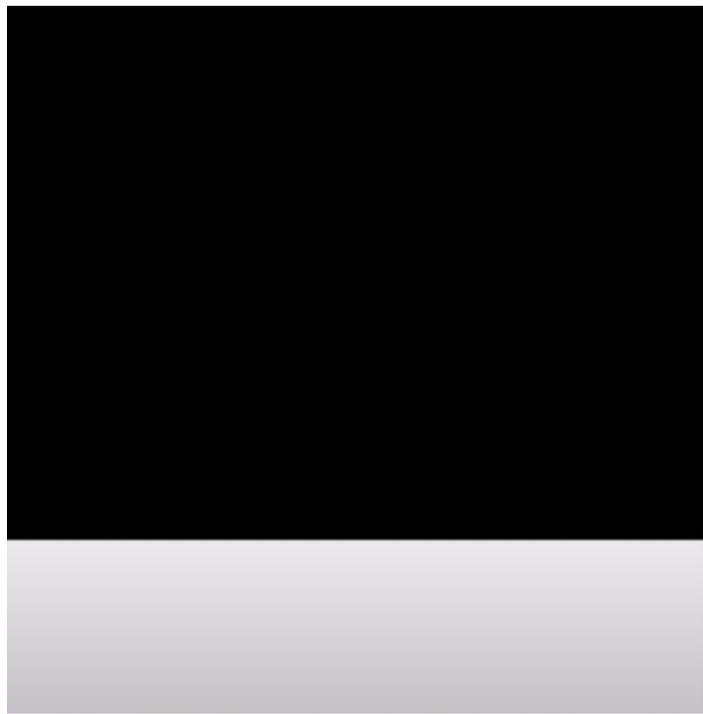
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ruleset

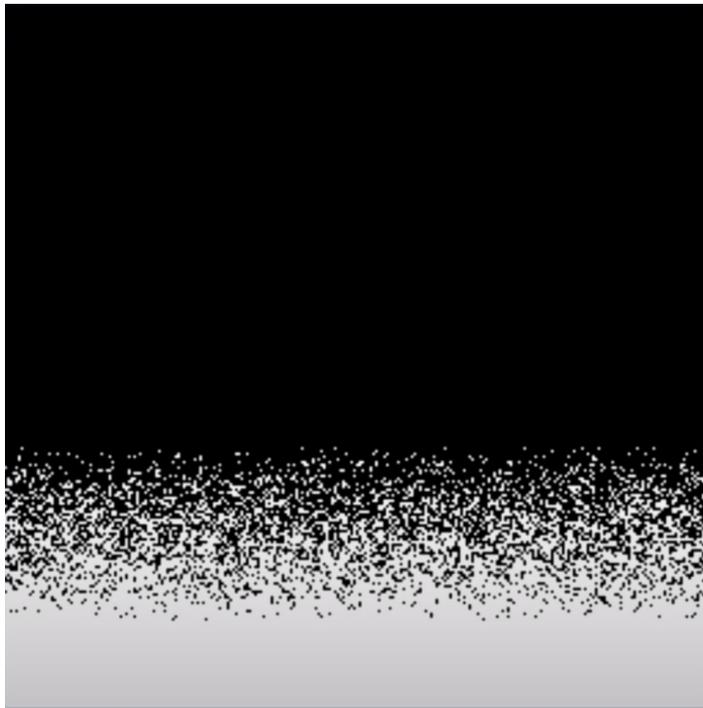
2d example



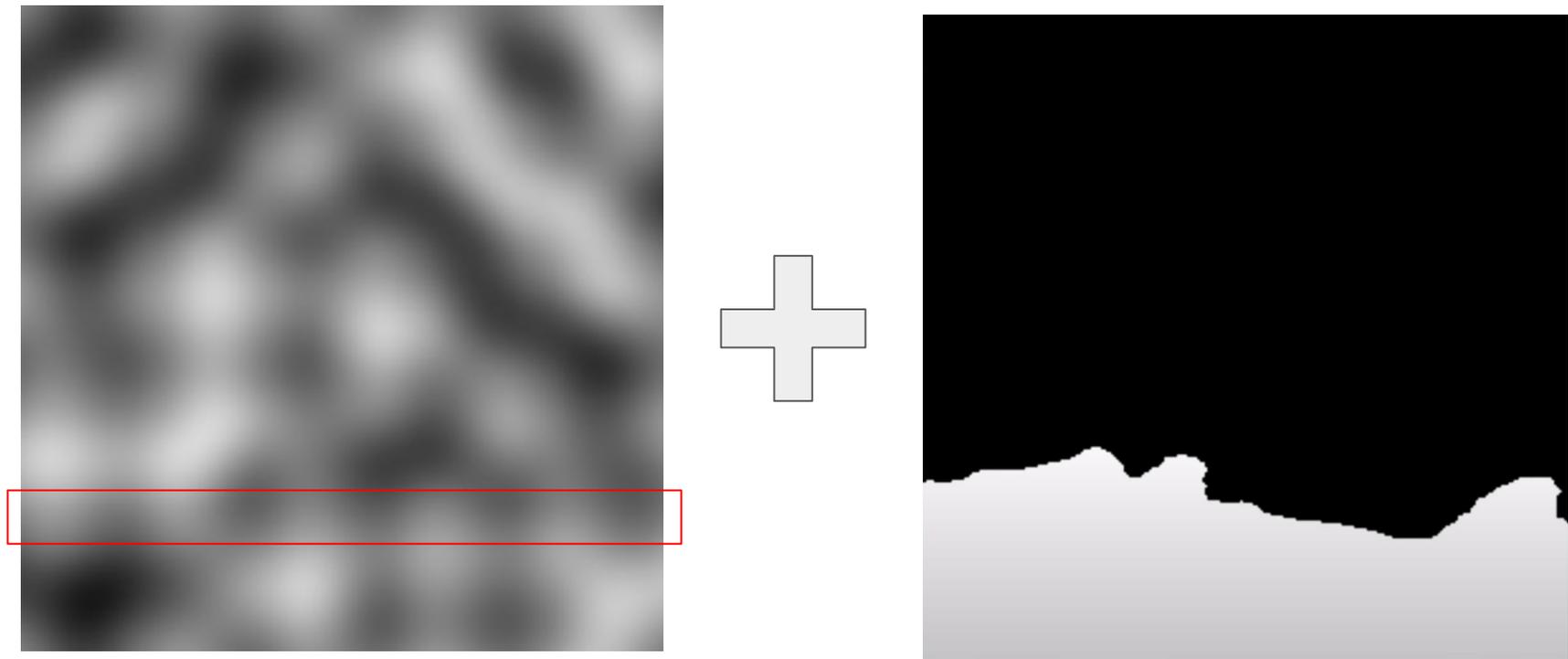
2d example



2d example



2d example



Wave function collapse

- randomized seed
- set of rules

- choose the lowest entropy
- collapse cell
- repeat

2		5	3		8	4		9
	7						5	
9		4				6		7
5				4				2
			5		7			
6				3				8
4		6				8		1
	2						6	
8		1	2		9	7		4

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