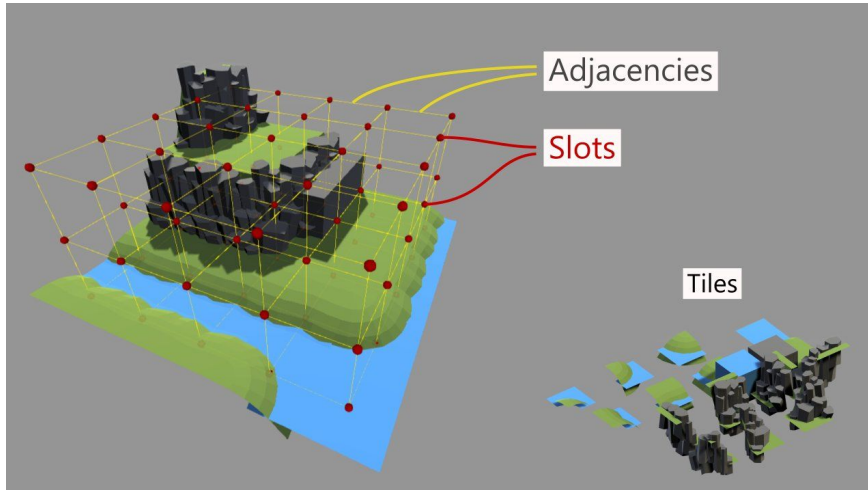# Wave Function Collapse





## Description

Wave Function Collapse (WFC) is a constraint-solving algorithm [Karth17] that was first designed for texture generation [Gumin16] but has been quickly used for enhancing 3D tile-based content generation [Stalberg18] (right-hand image above), in particular to mitigate the repetition effects that tile-based approaches usually suffer from. Given a collection of tiles and rules telling how they are allowed to neighbor each others, WFC assigns a tile to each slot.

The goal of this project is to implement WFC, maybe first in 2D (like [Stalberg17]) and then in 3D, and finally generalize to irregular grids. You should also find tile sets for which it fails at converging in a reasonable time.



*An irregular grid*

## Difficulty

Mathematics: easy
Implementation : advanced

## Encadrement

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## Références
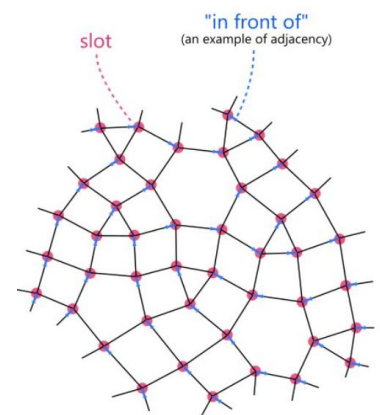
**[Gumin16]** Gumin, M. (2016). Wave Function Collapse. https://github.com/mxgmn/WaveFunctionCollapse. (source code)
**[Karth17]** Karth, I., & Smith, A. M. (2017, August). WaveFunctionCollapse is constraint solving in the wild. In *Proceedings of the 12th International Conference on the Foundations of Digital Games* (pp. 1-10).
**[Stalberg18]** Stalberg, O. (2018). Wave Function Collapse in Bad North. In *Everything Procedural Conference*. (talk) https://www.youtube.com/watch?v=0bcZb-SsnrA
**[Stalberg17]** Stalberg, O. (2017). Wave. http://oskarstalberg.com/game/wave/wave.html. (video game)