

The background of the entire page is a grid of thin black lines forming a diamond or checkerboard pattern. Scattered across this grid are numerous small, 3D architectural models. Each model is a square base with a complex, stepped top surface, resembling a staircase or a series of interconnected blocks. The models are drawn in a simple, sketchy line-art style.

Evolutionary Stairwells

MASTER IN ADVANCED ARCHITECTURE
SO.3 COMPUTATIONAL DESIGN - GENERATIVE ALGORITHMS
2016/2017

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Introduction

Deonar is a 90 year old garbage dump situated between two living environments. One that of humans in a slum that lack minimum living conditions, and the other of a dwindling population of mangroves that used to be the major geo-characteristic of the once green archipelago, Mumbai.

While the average age of a dumping grounds is 40 years, Deonar was set up in 1927. There have been several legal issuings to close it but has been open to the city's garbage for 90 years and accumulating waste as high as 18 storey towers. 70 percent of the waste is organic waste.

Toxic emmissions and recurrent fires make the living situation very unhealthy for the people living in the adjacent slum. Shortage of water, electricity and lack of education do not aid the situation in the slum.

Instead, it turns the dump into the major source of living to many of the people living there; a matter that makes the closing even more complicated.

Mumbai, once a 7 island archipelago has most of its current area reclaimed from sea, a largescale enengineering feat undertaken by the British in the 19th Century. This lead to the massive deforestation of mangroves, trees with rich ecological benefit including water and atmospheric quality improvements, sea level control and protecting shorelines from erosion. In turn the city has been facing yearly major floods, apart from the monsoon season, that harness an environment of diseases like small pox, cholera, scarlet fever and ...

Understanding the 3 major components of this intensifying crisis, social, waste and ecological the solution proposes an archeological excavation of the almost century old trash dump by digging inverted pyramids reminiscent of India's step wells. In these open mine structures the work is divided into 3 steps: *unearthing, sorting and fabricating.*

Depending on the type of waste sorted, it can provide a range of uses from handicrafts to building material. As more waste is unearthed, the wells go deeper to tap into the water that will once reclaim the land, giving back the mangroves their environment.

Strategy

We started from a cartesian grid given by the roads of the surrounding Slums, inbetween which the wells will be located.

But our aim is to prevent the water to flood the area. For this purpose we create a voronoid grid which gives us an irregular setting for the stepwells. This grid prevents efficiently the waterflow, and therefore protects from floodings.

On the long term, these Stepwells will be repopulated by the native ecosystem of mangroves and transform the the natural ecosystem that ones existed

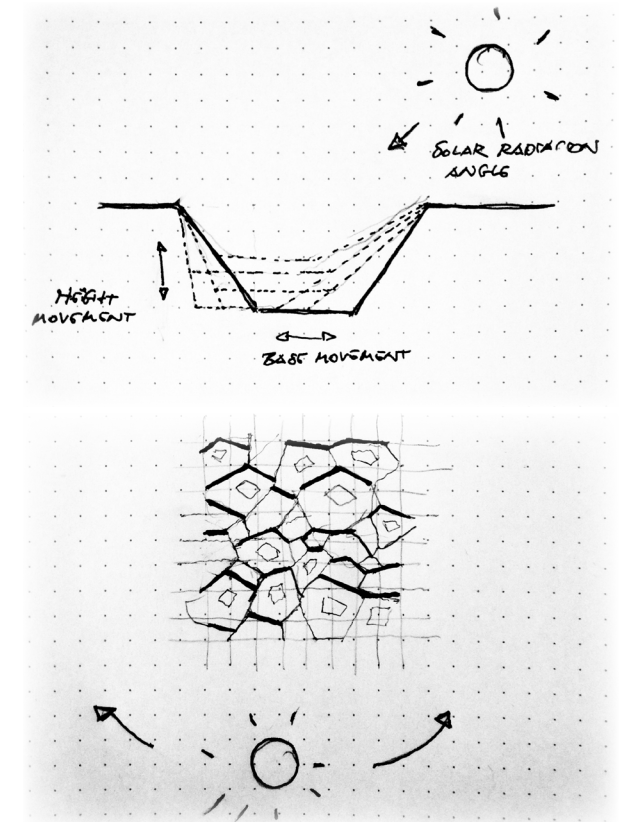
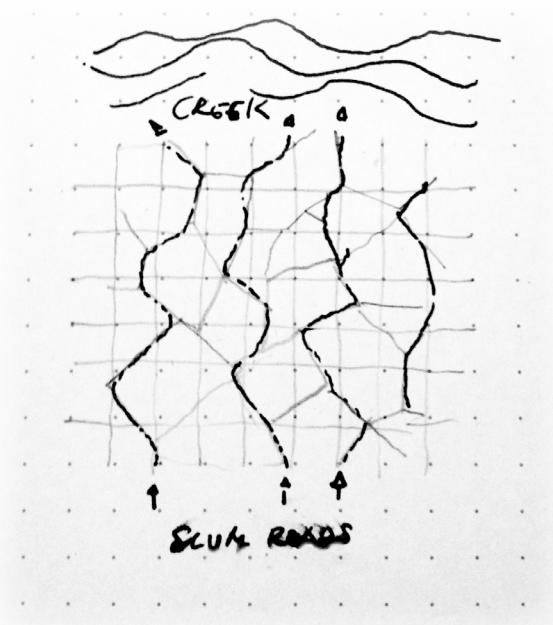
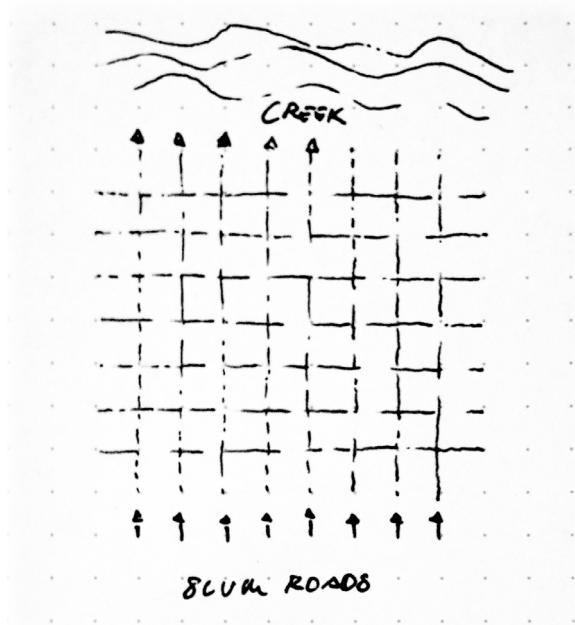
The traced voronoid grid with its excavated hollows seeks the best orientation to the sun, in order to give the best conditions of regeneration of the former ecosystem.

In order to achieve this condition we seek to optimize:

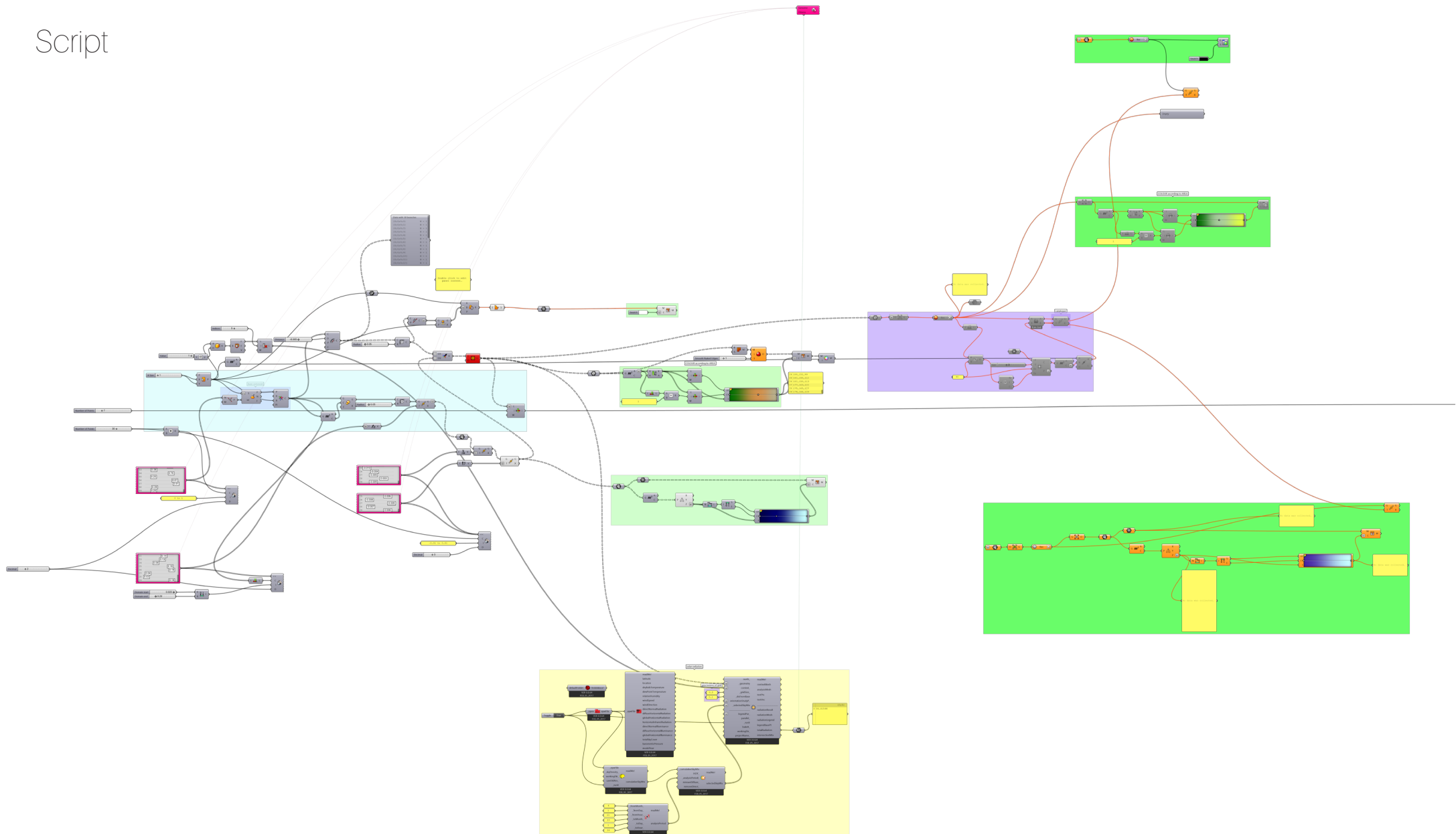
- the height
- the angel of the excavation
- and the layout of the wells.

These 3 parameters are plugged to a genepool and are run to achive the most convenient final shape.

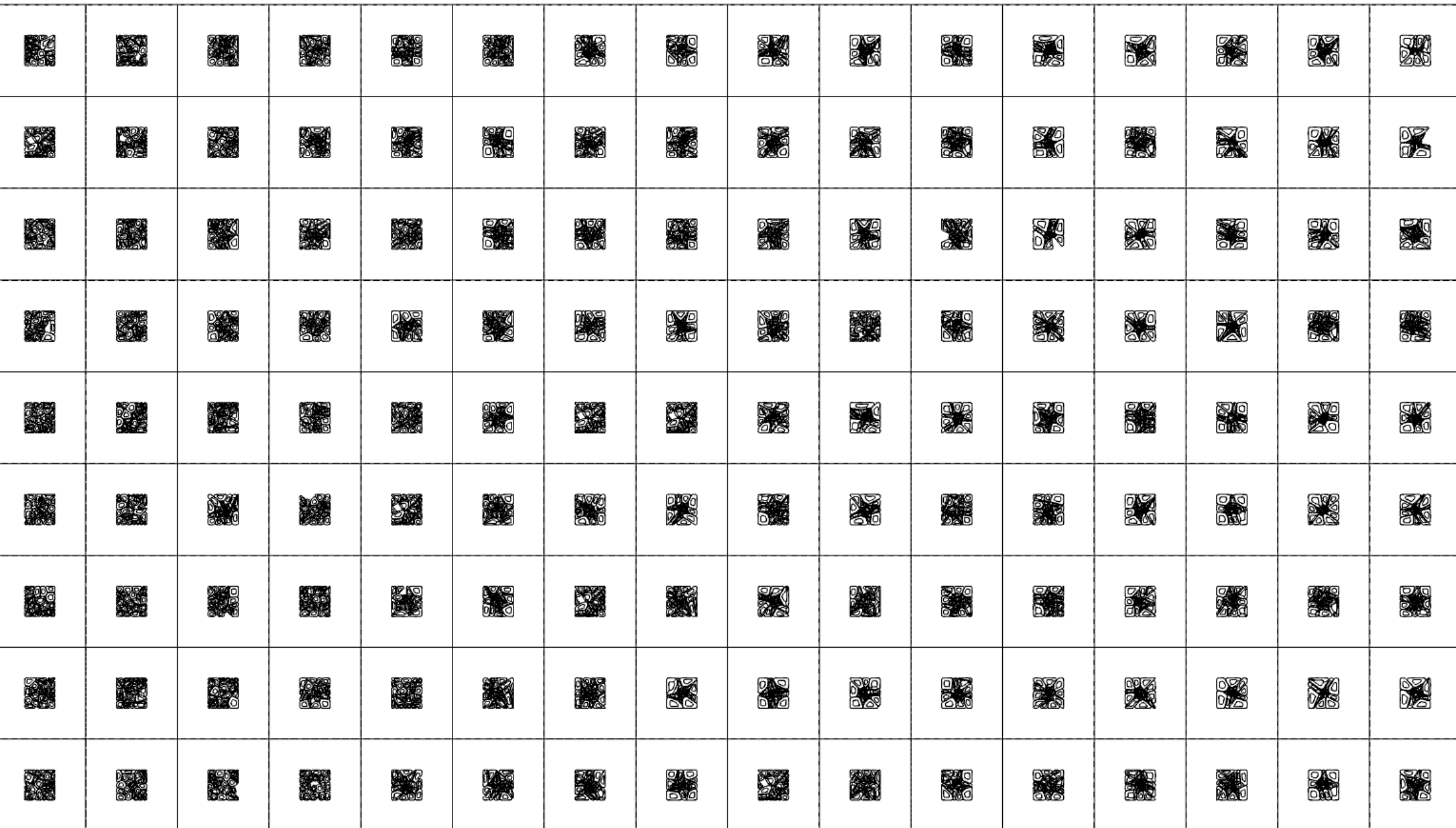
We use the pluggin of Ladybud to analyse the solar radiation, and Galapagos to optimize the shape during various recursion of optimization.



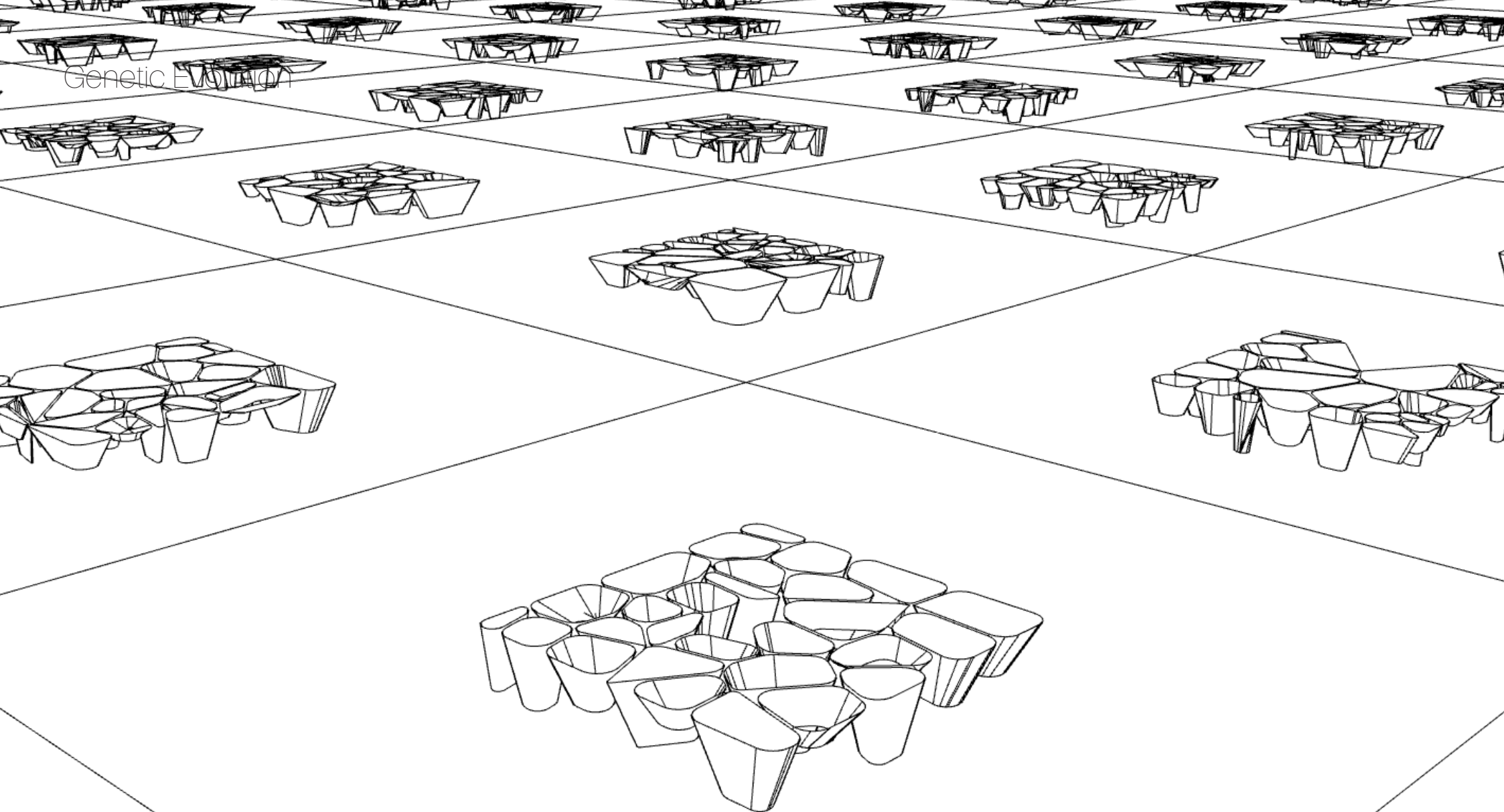
Script



Genetic Evolution



Genetic Evolution



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Best Shape

