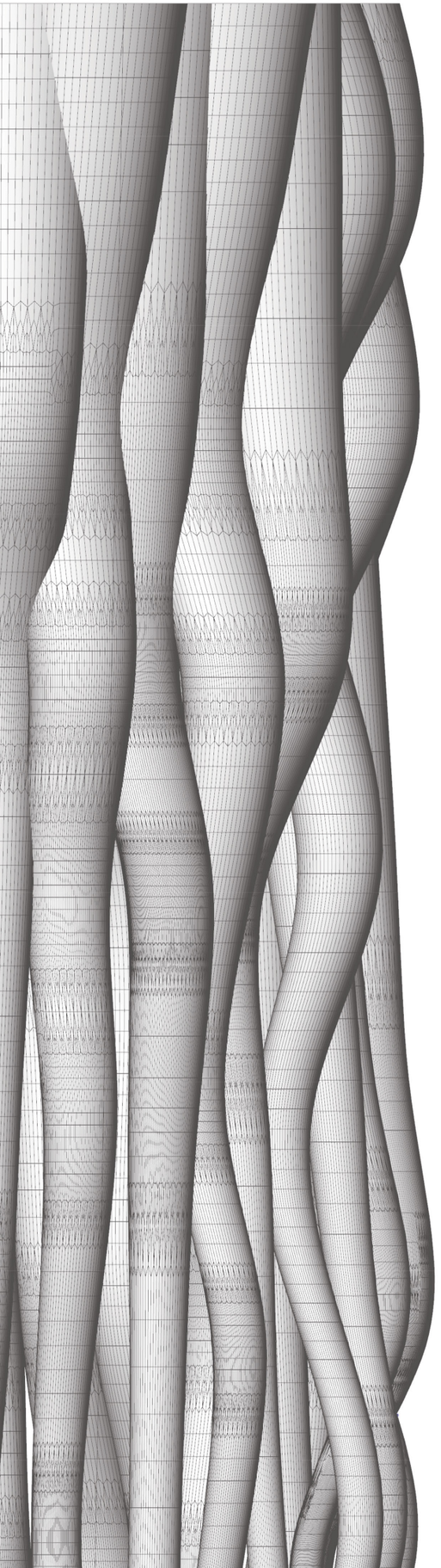


Institute for advanced architecture of Catalonia

BARCELONA

MASTER IN ADVANCED ARCHITECTURE
SO.3 COMPUTATIONAL DESIGN
2017/2018

TUTORS: ALDO SOLAZZO | RODRIGUO AGUIRRE

Artificial Evolutionary Design

Deepankar Pahuja | Gayatri Desai | Stephie Moukarzel

Using a **tubular** facade cooling system that operates by evaporation, our goals were to maximize the sunlight hours on the skin system and to provide the maximum area of surface to optimize the evaporation, while in parallel trying to block the views the least possible, and not having the skin span too far from the facade.

GEOMETRY


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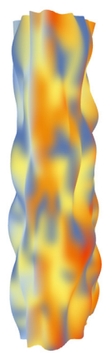

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PARAMETERS

P 1 DISTANCE OF SKIN FROM INITIAL POINTS OF THE BUILDING

P 2 PIPES DIAMETER

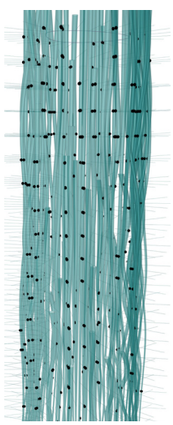
OBJECTIVES

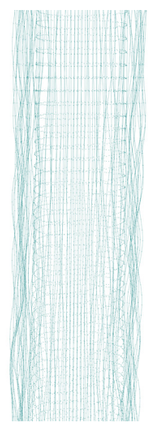
Ob 1 MAXIMIZING HOURS ON THE SKIN

Ob 2 MAXIMIZING AREA OF SKIN SURFACE FOR EVAPORATION

Ob 3 MINIMIZING VIEW BLOCKING

Ob 4 MINIMIZING DISTANCE BETWEEN SKIN AND BUILDING





Mesh

Sunlight Analysis

BIOMORPHER

First Optimization to Maximize Sunlight Hours

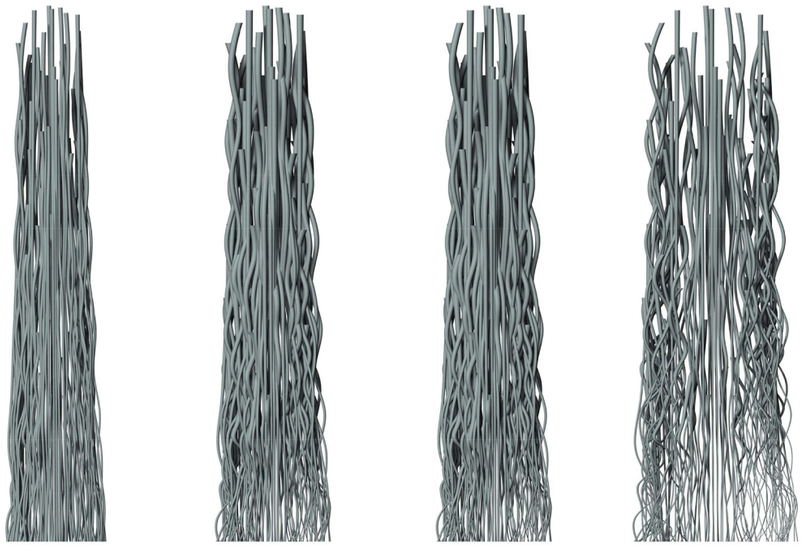
Tubes From Optimized Mesh

BIOMORPHER

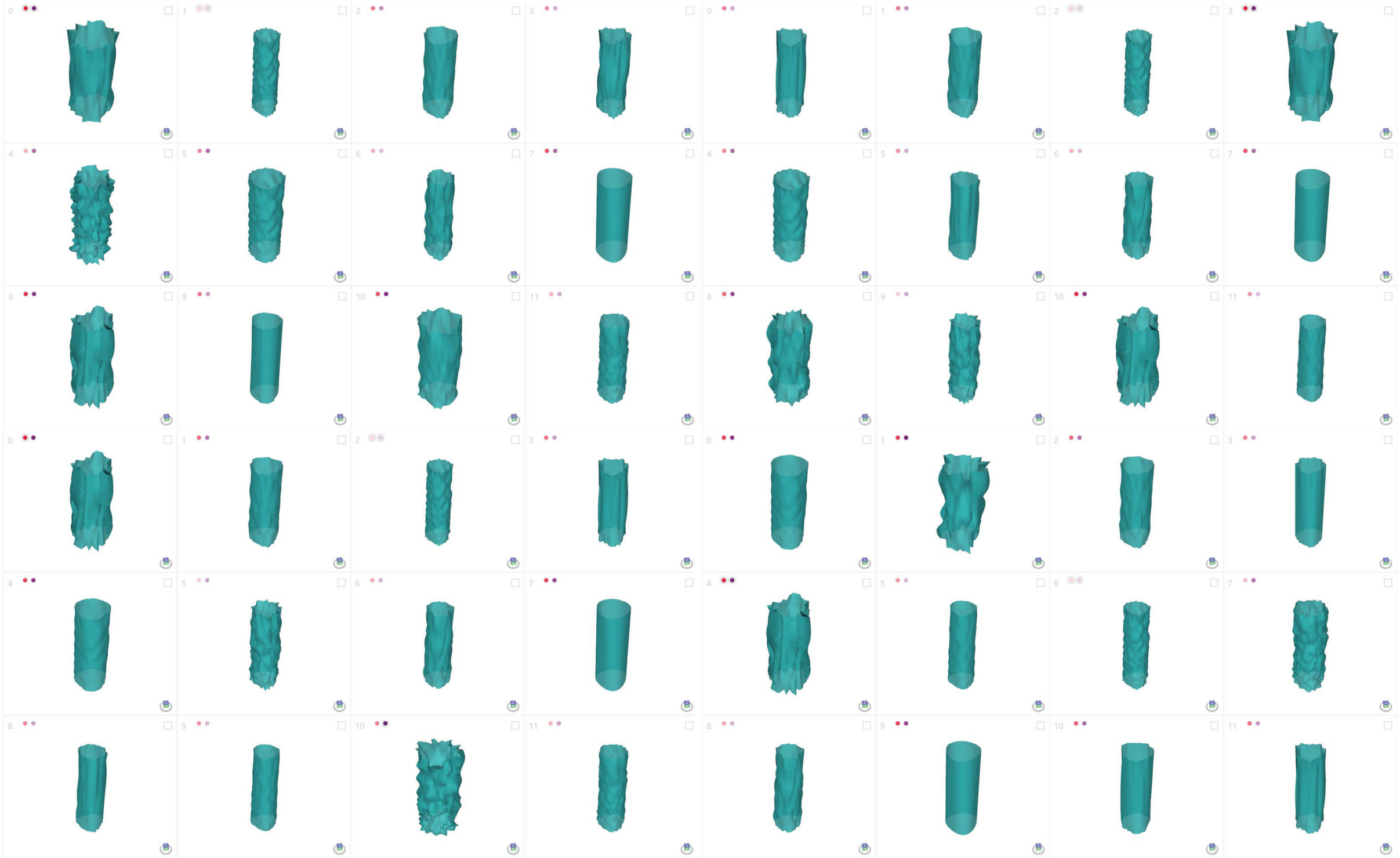
2nd Optimization to Minimize View Blocking and Maximize Area for Evaporation

Backwards Computing through Neural Network Training
OWL

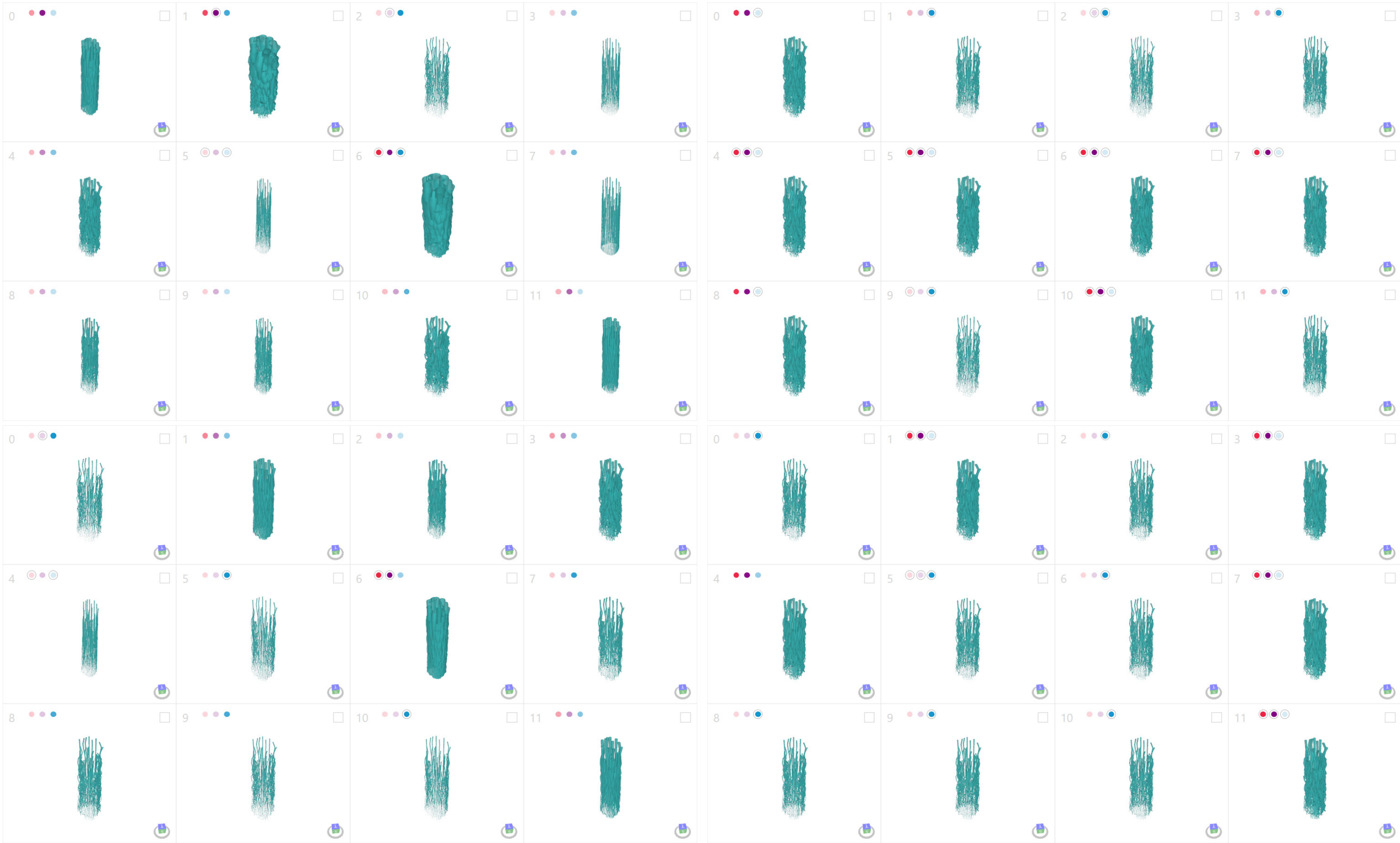
Neural Network Testing
OWL

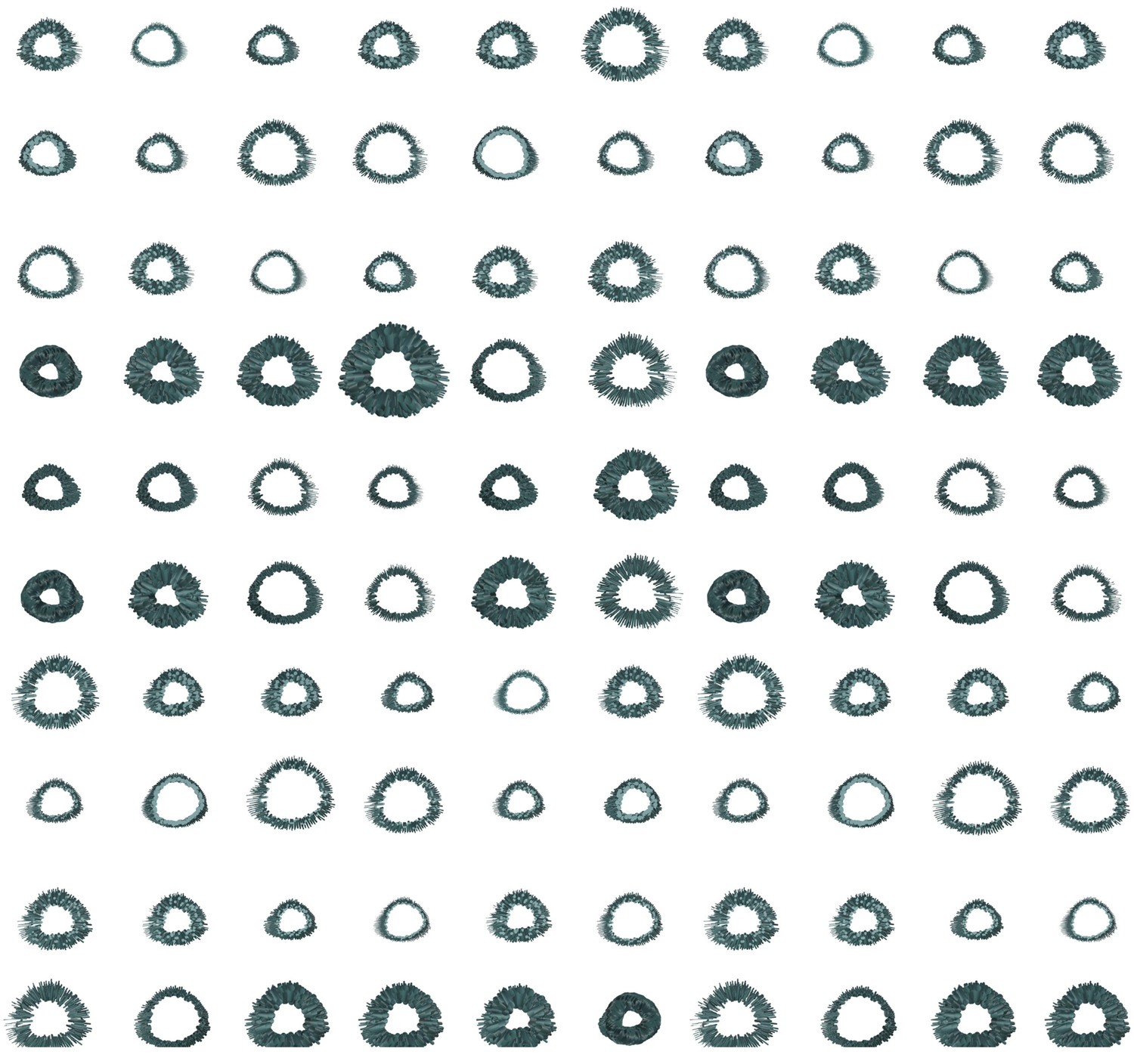


Surface Optimization for Solar Radiation

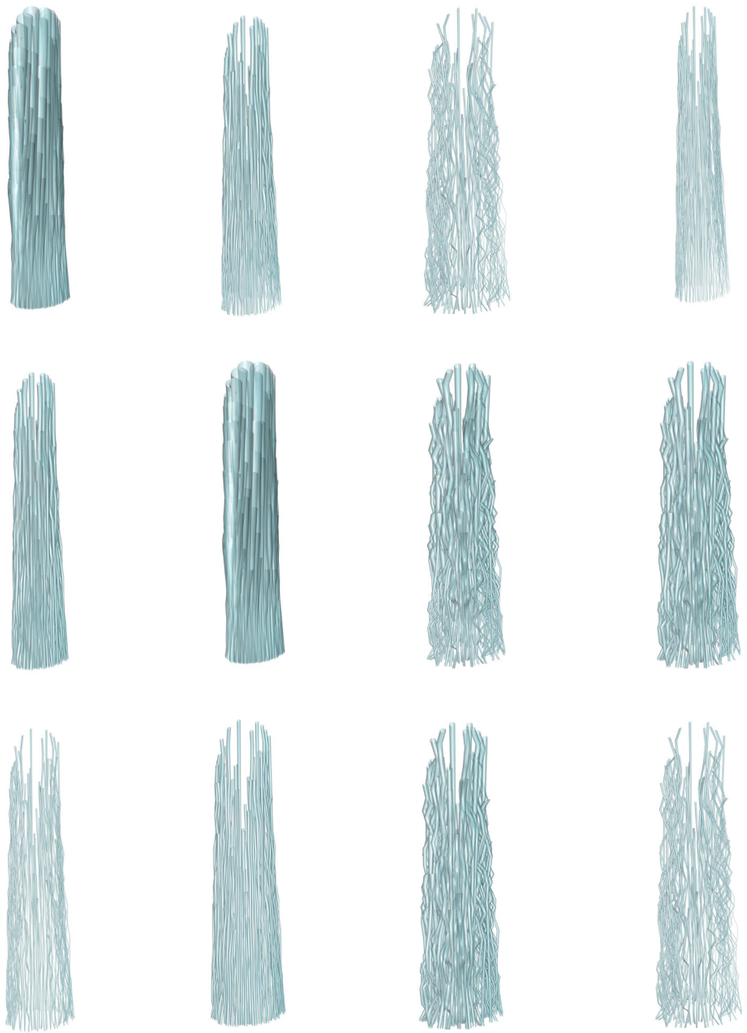


Tubes Optimization for Maximal
Evaporation and Wiews



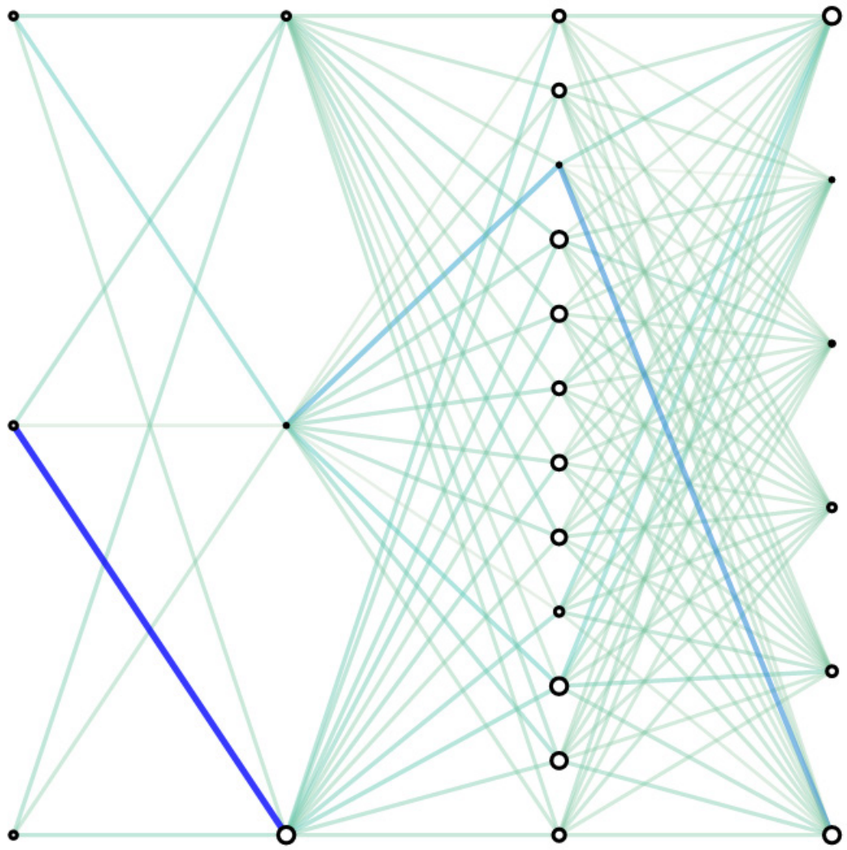


NEURAL NETWORK TRAINING



Testing Machine Learning Outputs

Minimal Error Value Achieved: 0.001



Inputs: **3** (Objectives)

Outputs: **6** (Parameters)