Digital Design Methods I (2022F)
Institute of Landscape and Urban Studies (LUS)
D-ARCH, ETH Zurich

Assignment 2.B

`Digital Design Methods I`

OVERVIEW

This assignment will focus on what you've learned in the last lecture – "Data Tree" in Grasshopper. After this assignment, you should become more comfortable with operating complex data structures (list, tree, list + tree) in Grasshopper and apply it to your daily tasks.

This assignment may seem challenging at the beginning, but are all advanced basics for working with Grasshopper.

ASSIGNMENT

In the provided `Assignment_2B.gh` file, you will find the input data of this assignment. Your task is to create the corresponding Grasshopper scripts for the requirements below.

1. LINE CONNECTION

For this task, you're given two sets of points with the same number *N* (can be adjusted by a single slider). Your task is to connect lines between the two set of points by the following requirements (each requirement is an independent task):

LEVEL-1

1. Connect lines between the two points with the same corresponding index ($0-0, 1-1, \cdots$). The total number of lines should equal to the point number of each set.
2. Connect lines between the two points with the same sum of corresponding index (if total 10 points, then $0-9, 1-8, \cdots$). The total number of lines should equal to the point number of each set.

3. Connect lines between every point in set A with every point in set B. The total number of lines should be $N \times N$.

LEVEL-2

1. Connect lines between every point in set A (except for the first/last point) with every point in set B. The total number of lines should be $(N-2) \times N$.
2. Connect lines between the corresponding points with 'odd index' in set A and 'even index' in set B. The total number of lines should be $\frac{N}{2}$.
3. Connect lines between every points with 'odd index' in set A and 'even index' in set B. The total number of lines should be $\frac{N}{2} \times \frac{N}{2}$.

Hint: Check out the 'CULL xxx' component series.

2. TOPOGRAPH

For this task, you will use the result of task `Task-1:Level-1.1` as the starting point, and build a topography after completing all the tasks below.

LEVEL-1

1. Divide the N lines into a series of points with a decent resolution. Apply a 'sine'/'cosine' function to the allevation (z-component) of those points.
2. Connect the modified points into N curves.
3. Loft the curves into a continuous surface. (Similar to Figure 1)

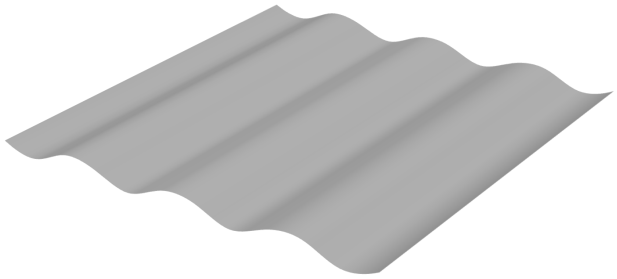

Figure 1: Example result of Task 2: Level 1.

LEVEL-2

1. Divide the N lines into a series of points with a decent resolution. Apply a 'sine' wave function to the allevation (z-component) of those points. Additional requirement upon Level-1: When applying the wave function, make sure the start/end point of each curve maintain the same location.
2. Connect the modified points into N curves.
3. Loft the curves into a continuous surface.

Hint: Check out the 'Bounds, Remap' components.

LEVEL-3

1. Divide the *N* lines into a series of points with a decent resolution. Apply a 'sine' wave function to the allevation (z-component) of those points. Additional requirement upon Level-2: When applying the wave function, make sure that one of the peaks of the sine wave appears at the diagnal line of the topology.
2. Connect the modified points into *N* curves.
3. Loft the curves into a continuous surface.

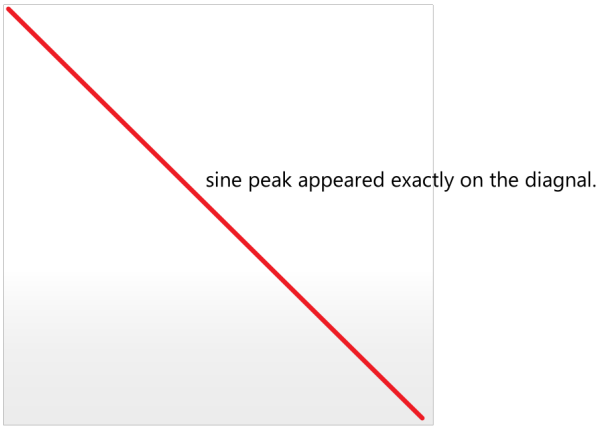

Figure 2: Illustration of Task 2: Level 3.

INPUT FILE

- `Assignment_2B.pdf` (this file)
- `Assignment_2B.gh`

HINT

Some of the components for manipulating lists/trees are not introduced in the lecture but may be required for completing the assignment. This is the time for you to explore. Please refer to the corresponding panels as you need (Figure 3).

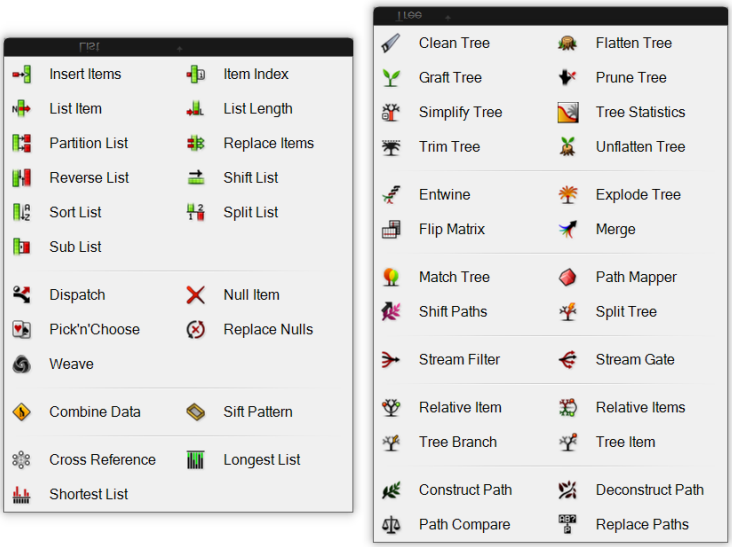

Figure 3: Tools for manipulating lists and trees.

SUBMISSION

DEADLINE

- 27/11/2022 (23:59)

Submission(s) beyond the deadline will not be counted.

FORMAT

Please submit a `.pdf` file and the corresponding `.3dm` file to the submission on the server: `\\nas22.ethz.ch\arch_lus_mscla_student\5_HS_22\02_DDM-I\90_Submission\AS_02.B`

The naming of the submission file should follow: **LastName_FirstName_AS02.B.xxx**

LINKS

The following materials are listed for reference:

- Grasshopper Primer v3
- DDM website