Date: 06/04/2019

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Intro to L-systems

I referred to a website to learn the introduction to L-systems. The URL of the website is https://morphocode.com/intro-to-l-systems/

I learned that an LSystem is a parallel string rewriting system. All the LSystems work on a basic set of rules for specifying the symbols in a string. The symbols are

rewritten as strings.

For example:

seed: A

The rules are:

Rule 1: A=AB

Rule 2: B=BA

Next, the LSystems by default start with the seed=A and iteratively rewrites that string using the production rules. n i usually defined as the derivation length of the

string, which is further equal to the number of iterations.

n=0:A

n=1:AB(A becomes AB according to Rule #1)

n=2: ABBA(A becomes AB according to Rule #1, while B becomes BA according to Rule #2. In result we get ABBA)

n=3: ABBABAAB

n=4: ABBABAABBAABABBA

and so on...

So basically each string represents a word. All words from the language of the System.

The next is learning the different types of LSystems: deterministic, stochastic, context-free, context-sensitive, parametric, timed-depending on the rules and the way they

are applied by the LSystem.

The applications of the LSystems are:

1: herbaceous plants

2: neural networks

3: the procedural design of cities

4: generative art

5: generative music

As we saw that the central system of LSystems is basically rewriting of strings.

The general form of LSystem rule is [left\_context<] symbol [>right\_context] [:condition]=replacement [:probability]

Where:

left\_context- An optional string that must precede the symbol for this rule to match.

symbol- The symbol to replcae. Like A is replaced by AB and B is replaced by B BA.

right\_context- An optional string that must follow the symbol for this rule to match

condition- An optional expression that must be true for this rule to match.

replacement- The string that will replace the symbol

probability- The optional chance(between 0 and 1) that this rule will be executed. This wouldn't exactly gonna be 0 or 1, is usually a decimal.

TURTLE Commands:

It is completely possible to manipulate the strings system with the Graphics routine that interprets the strings as commands for drawing "turtle with position (XYZ)" and heading(angle).

Some examples are:

F- Move forward a step, drawing a line connecting the previous position to the new position.

f- Move forward without drawing.

+ Rotate right 90 degrees

- Rotate left 90 degrees

One of the most important things in LSystems are Branches:

In LSystems we create the branches with square brackets([ and ]). Any turtle commands inside the square brackets are executed differently than the actual string

commands.

For example, the commands F [F+] F [F+] [-F] state that:

1: Go forward

2: Branch off a new turtle and have it turn right and then go forward.

3: Go forward

4: Branch off a new turtle and have it turn the right and the go forward.

5: Branch off a new turtle and have it turn left and then go forward.

This creates this figure: