

L-Py: L-Systems in Python



F. Boudon et C. Pradal



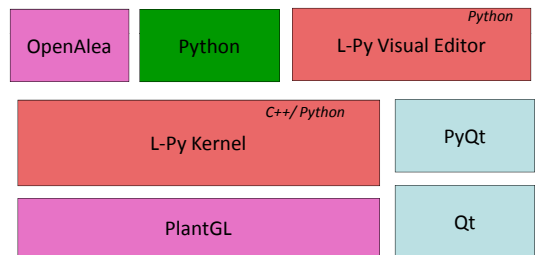
The Lindenmayer Systems

- Introduced by A. Lindenmayer in 1968
- Simulation of multi-cellular organisms
- Dynamic Systems with Dynamic Structures (Giavitto, 01)
- Well adapted for modeling plant growth (Prusinkiewicz, 90). Widely used for FSPM
- L-systems consist of an alphabet V , an axiom w and a set of productions P .
 $G = \langle V, w, P \rangle$

- Productions are applied to a string in parallel.

left context < predecessor > right context \longrightarrow successor

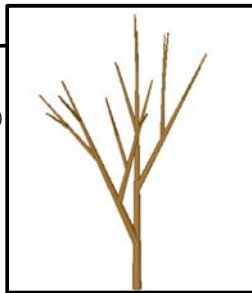
L-Py Architecture



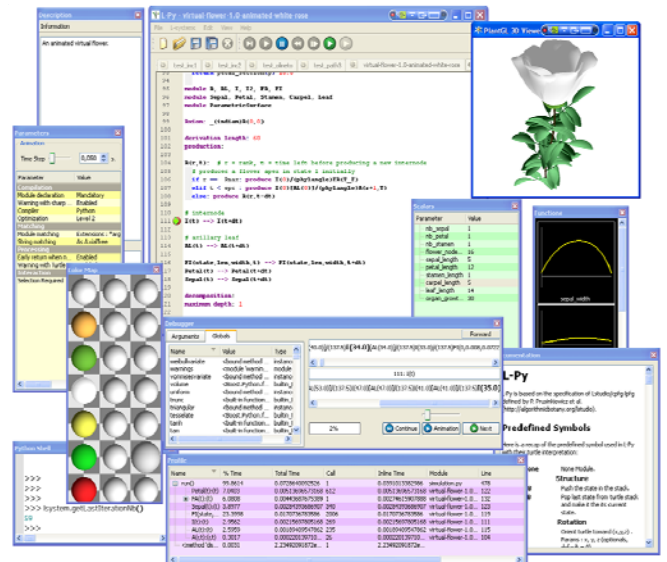
L-Py Syntax

```

from random import random
MAX_AGE, dr = 10, 0.03 # constants
module Apex(age), Internode(length,radius)
Axiom: Apex(0)
derivation length: 5
production:
Apex(age) :
    if age < MAX_AGE:
        produce Internode(1+ random(),0.3)
            /((137)[+(30)Apex(age+1)]Apex(age+1))
Internode(l,r) --> Internode(l,r+dr)
interpretation:
Internode(l,r) --> _(r) F(l)
endsystem
    
```



L-Py Development Environment



Turtle Interpretation

Predefined modules command the 3D turtle.

$F(3)[+(60)F(2)[-(40)F(1)]]$

Using guides

Applications

