JupyterLab NodeEditor (JLNE)

Visual Programming Powered Jupyter Extension for Domain Experts

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GitHub Repository

Codespace

Introduction

Jupyterlab NoeEditor (JlNE) is a **graphical user interface** that leverages a dataflow-driven visual programming language, which aims to enhance the capabilities of domain experts in data science tasks.

JupyterLab NodeEditor (JLNE), leveraging **IPyWidgets** , **pythreejs** , **Rete.js** and **Vue.js** , integrates visual programming with JupyterLab's interactive coding feature, aimed at creating a low-code environment and making programming accessible.

Motivations

Domain experts, especially those **without** programming experience, continue to face difficulties when dealing with computational tasks. These challenges including

- familiarizing themselves with complicated logics
- learning programming syntax
- spending substantial time and effort on debugging.

Despite the development of thousands of computational models designed to overcome such barriers in plant biology, **integrating and executing model integration networks is still difficult** .

Why JLNE

Multi-language Operation
built upon yggdrasil, JLNE naturally supports scripts written in Python, C, C++ and Matlab…

Reusability
Designed to make scripts as reusable as possible

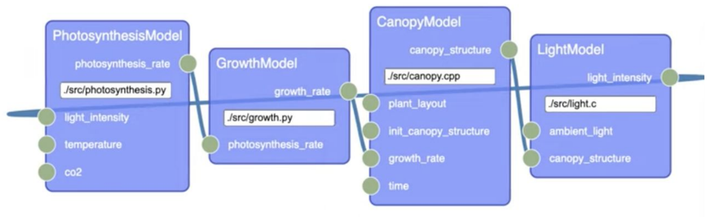
Accessibility
Running script without programming training

Define a block via YAML

```
model:
  name: CanopyModel
  language: c++
  args: ./src/canopy.cpp
  inputs:
    - name: plant_layout
      default_file:
        name: ./Input/plant_layout.txt
        filetype: table
    - name: init_canopy_structure
      default_file:
        name: ./Input/canopy_structure.txt
        filetype: table
        as_array: True
    - name: growth_rate
      default_file:
        name: ./Input/growth_rate.txt
        filetype: table
    - name: time
      default_file:
        name: ./Input/time.txt
        filetype: table
  outputs:
    - name: canopy_structure
      default_file:
        name: ./Output/canopy_structure.txt
        filetype: table
        as_array: True
        field_names: x1,y1,z1,x2,y2,z2,x3,y3,z3
```

Select block from toolbox

Interlock blocks

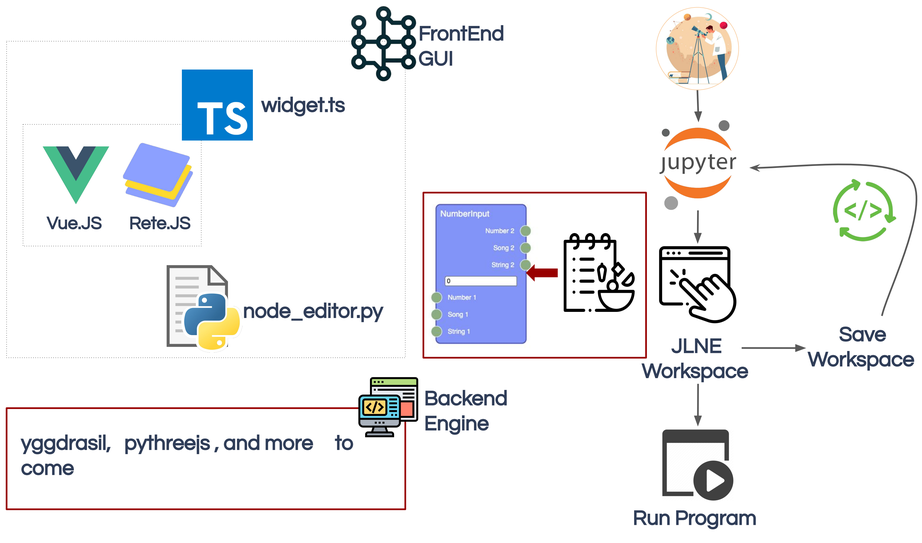


Run computational tasks

```
                  init        0.000001
          load drivers       25.765741
         start drivers        0.160355
             run models        2.783190
                at exit        0.063987
----------------------------------------
                 Total       28.773274
```

Show Visualizations

JLNE Core



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Crops *in silico*