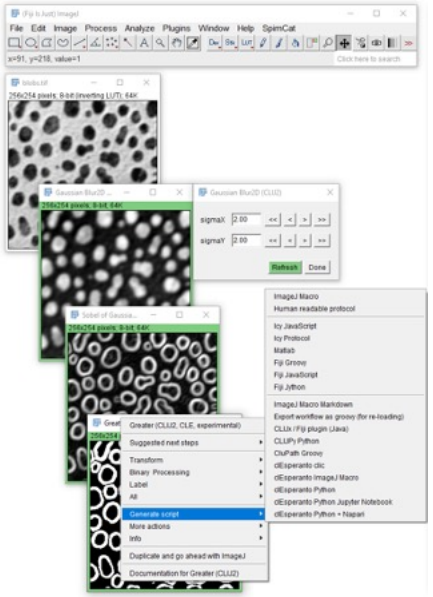
PoL Physics of Life TU Dresden

CENTER FOR SYSTEMS BIOLOGY DRESDEN

From assistant to notebooks

Till Korten



jupyter

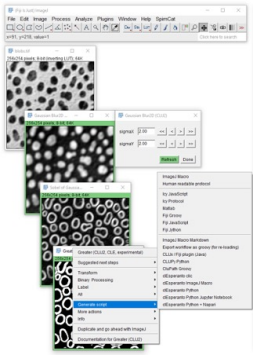
With material from: Robert Haase

June 2023

@TillKorten

Outline

- Exporting workflows as notebooks

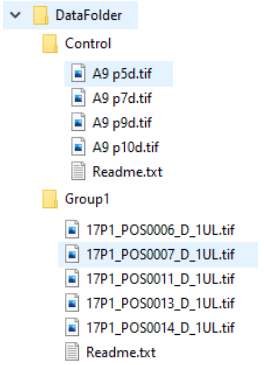


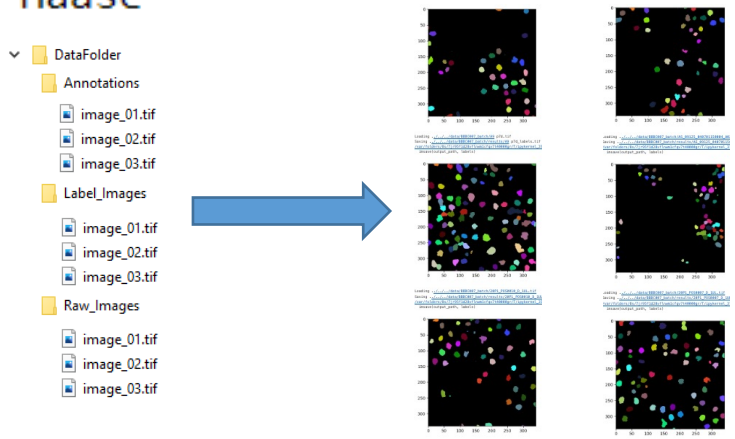
- Python programming basics

```python
firstname = "Robert"
lastname = 'Haase'

print("Hello " + firstname + " " + lastname)
```

```
Hello Robert Haase
```

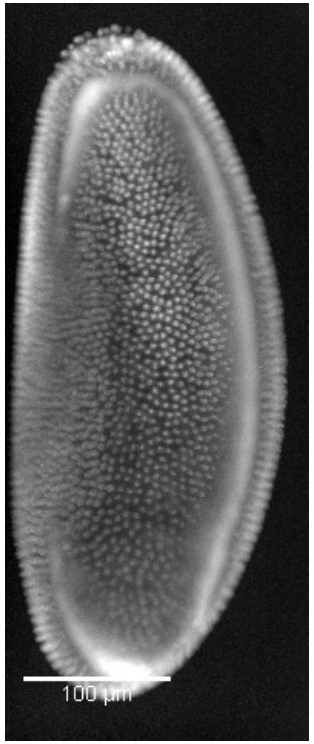
- Processing folders of images

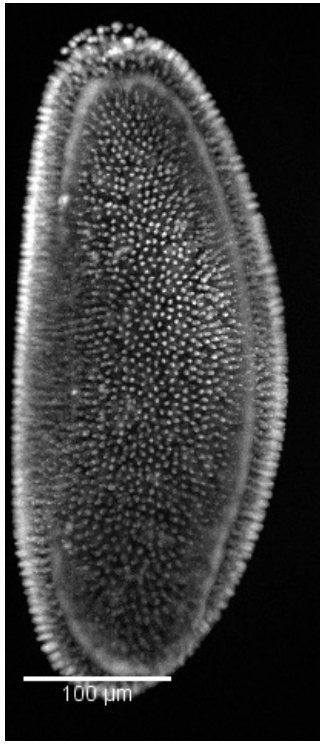


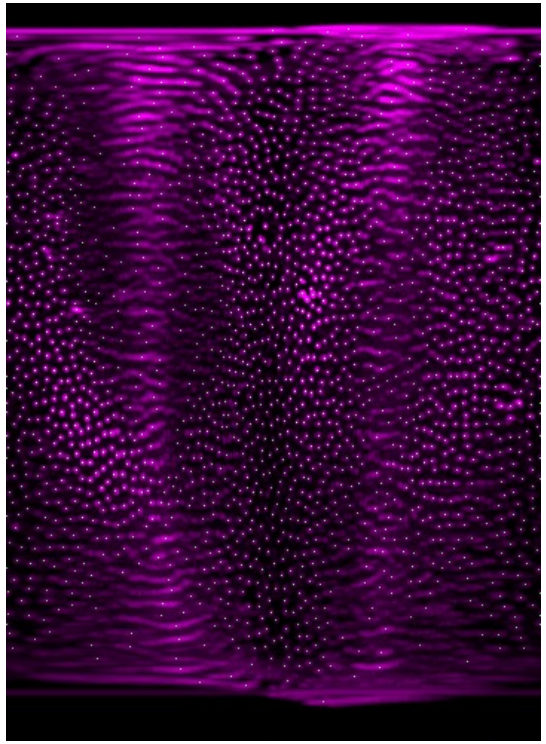


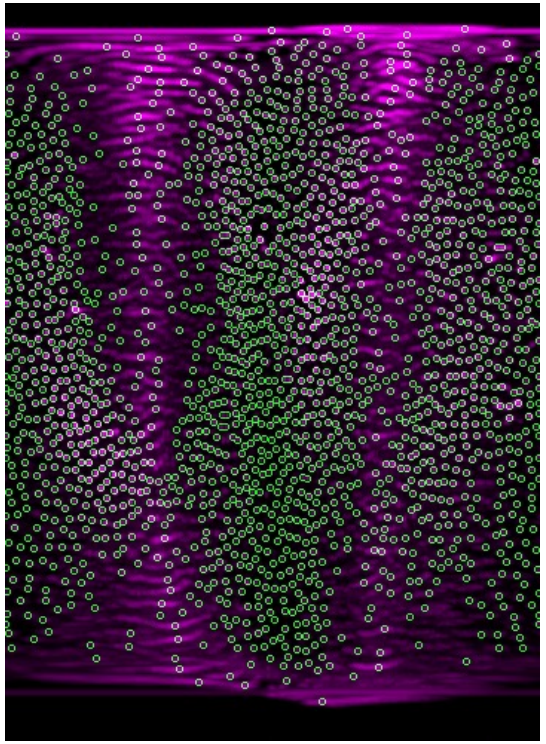
Recap – image analysis workflows

Load data → Preprocessing → Transformation → Segmentation → Save data





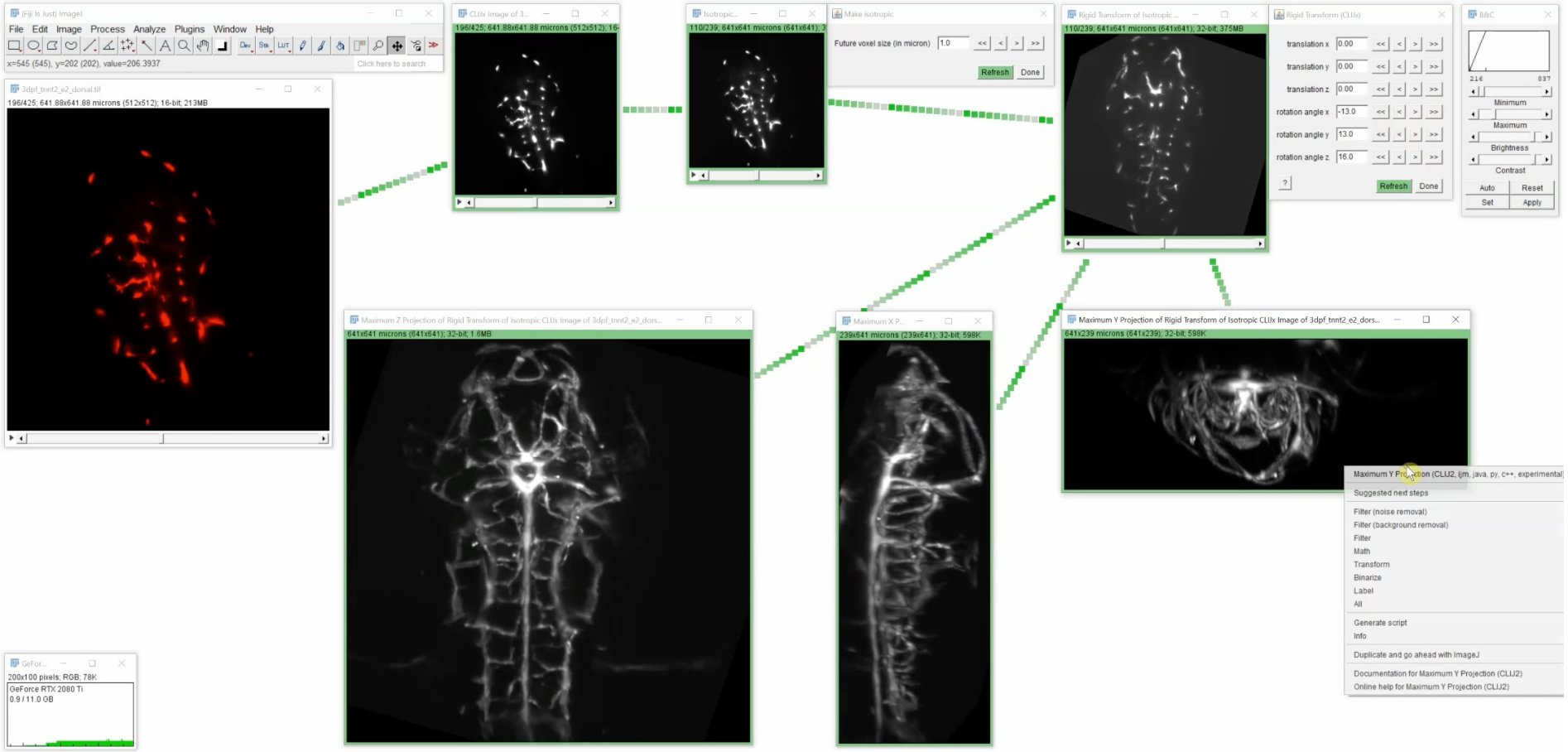




Haase et al Nat Methods (2020)

Fiji/clij: Set up a workflow + generate code

- After setting up the workflow, generate code!

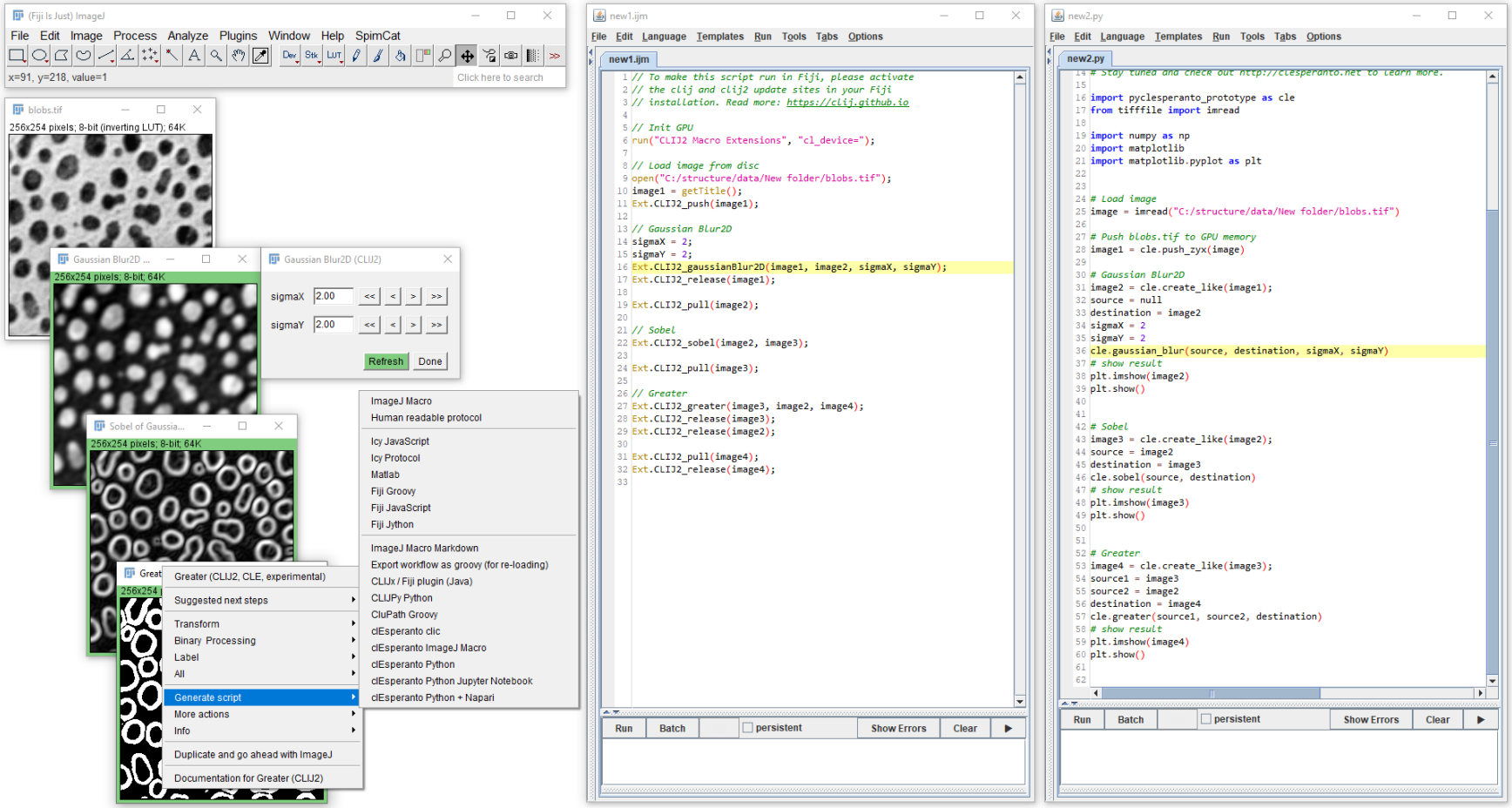


Special thanks to Elisabeth Kugler!

Elisabeth Kugle
@KuglerElisabeth

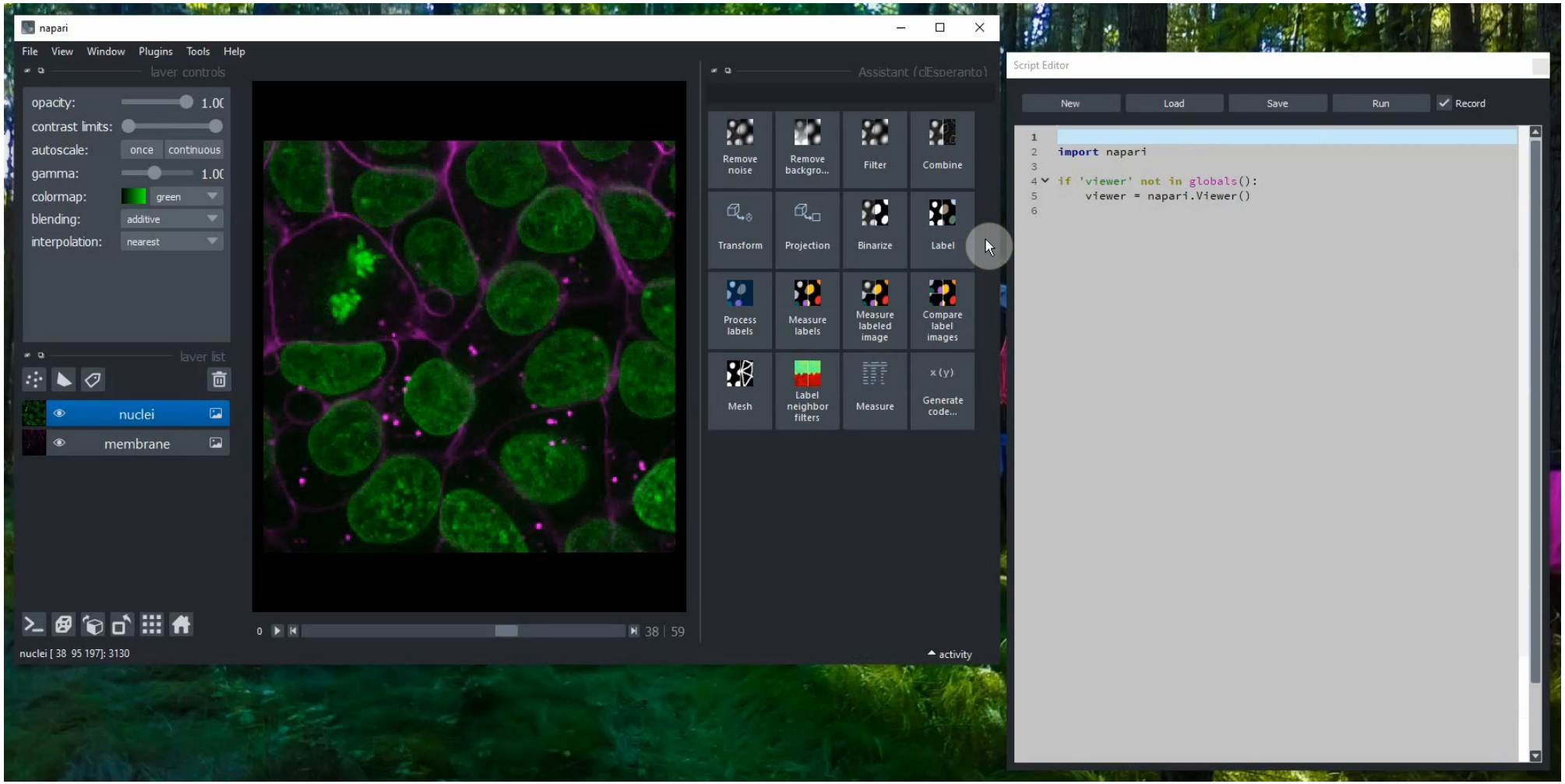
Image data source: Elisabeth Kugler; labs of Tim Chico and Paul Armitage, The University of Sheffield (UK)" https://zenodo.org/record/4204839#.X8DCRGj7Q2w

Choosing a programming language



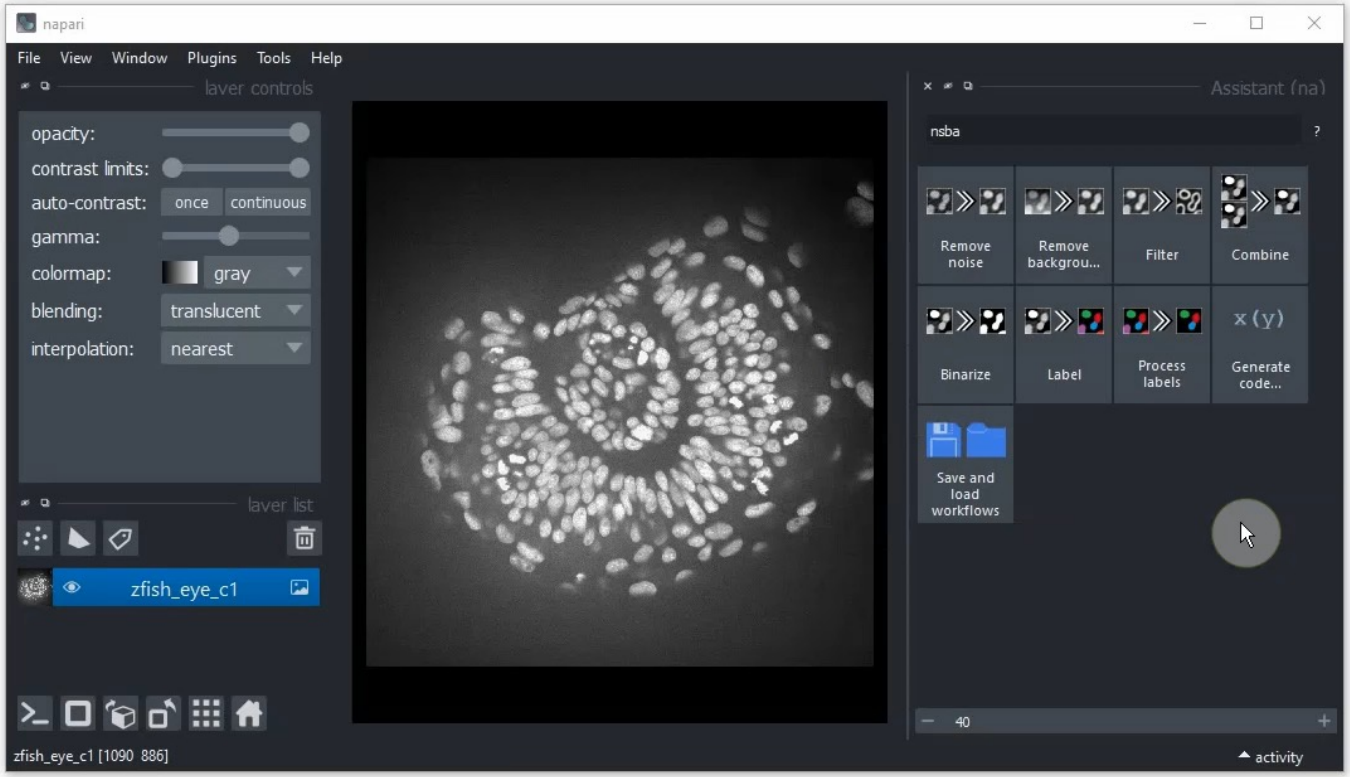
- Do you have access to existing scripts from others (and does the license allow you to use them)?
- Do you need other tools/packages (e.g. a deep learning python package)?
- Personal preference

Create a workflow with Napari-Assistant



https://www.napari-hub.org/plugins/napari-script-editor

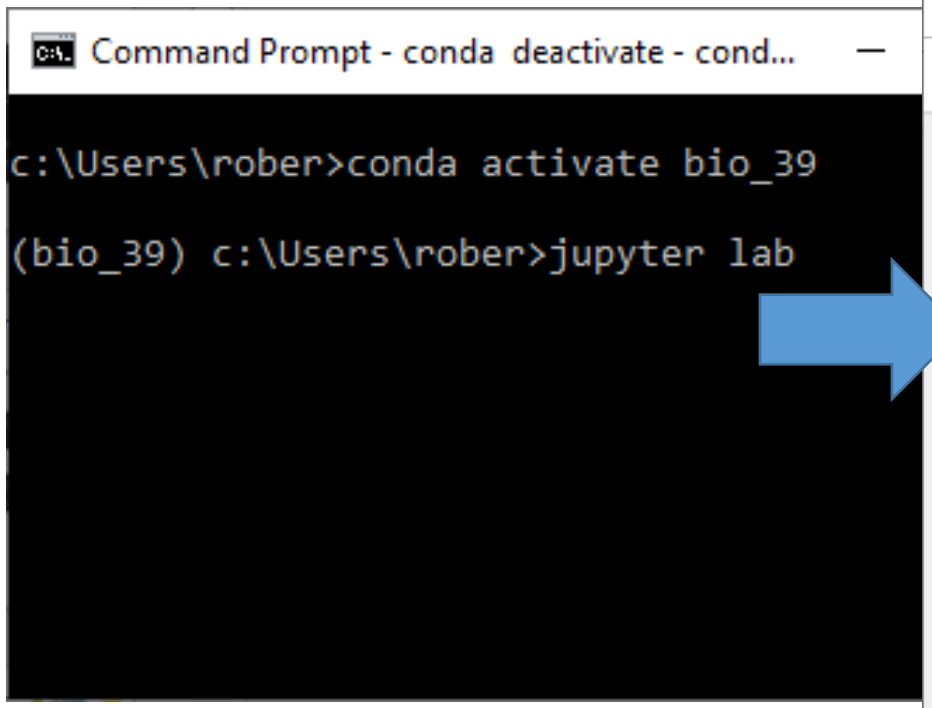
Export code to Jupyter Notebooks

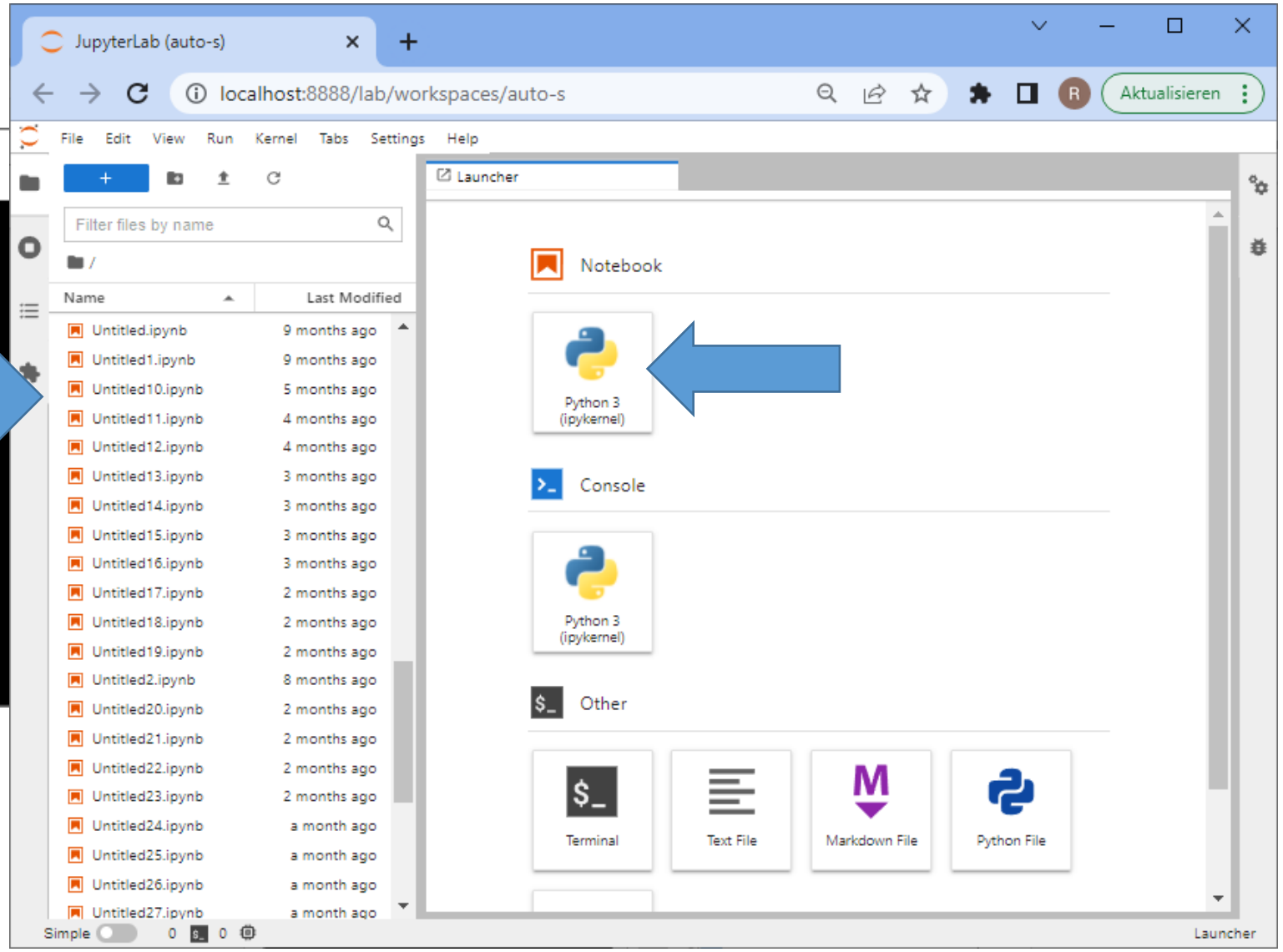


https://github.com/haesleinhuepf/napari-assistant

Image data source: Mauricio Rocha Martins, Norden lab, MPI CBG (now at IGC Oeiras)

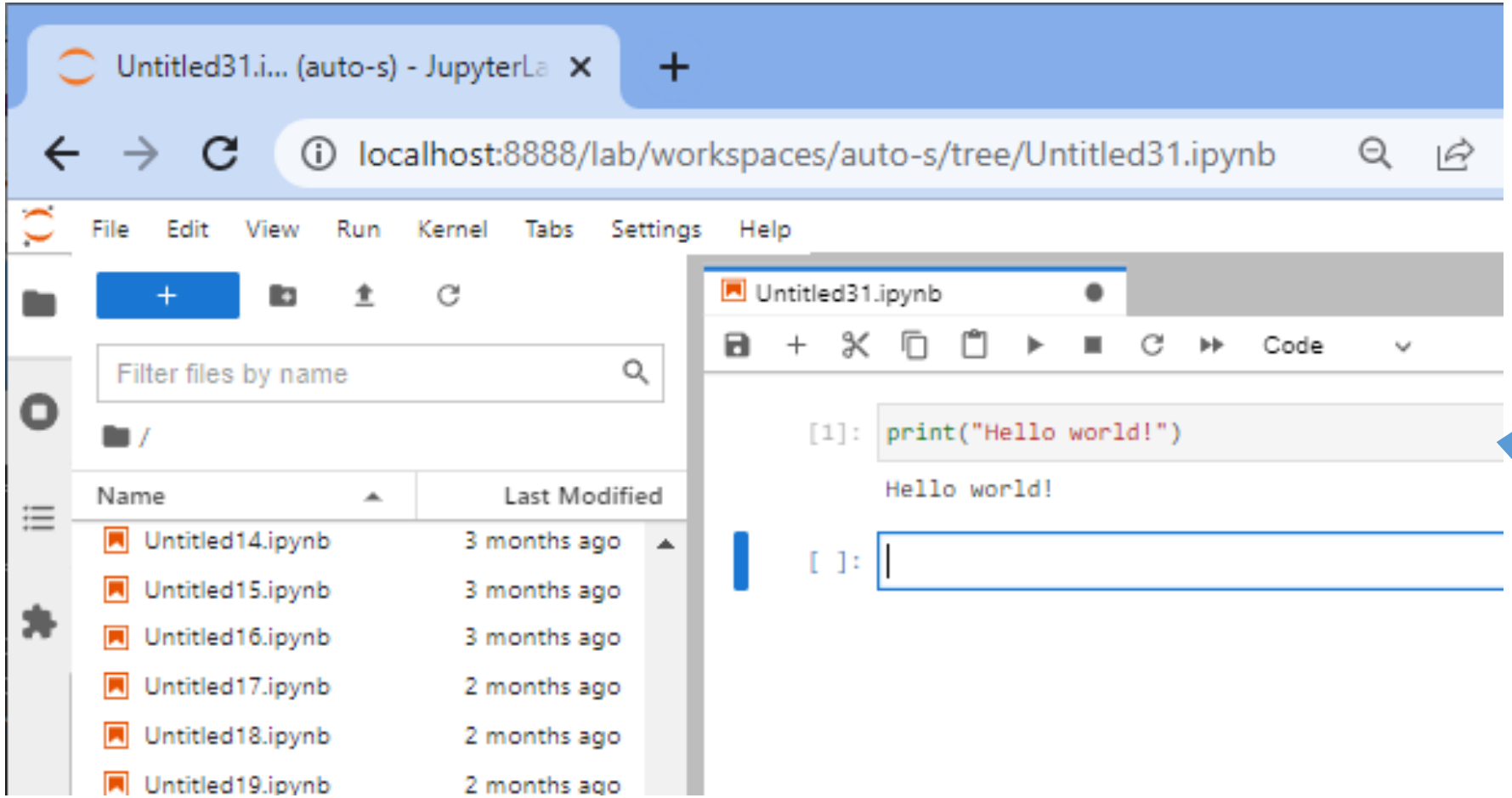
Open the notebook in Jupyter lab





Jupyter lab

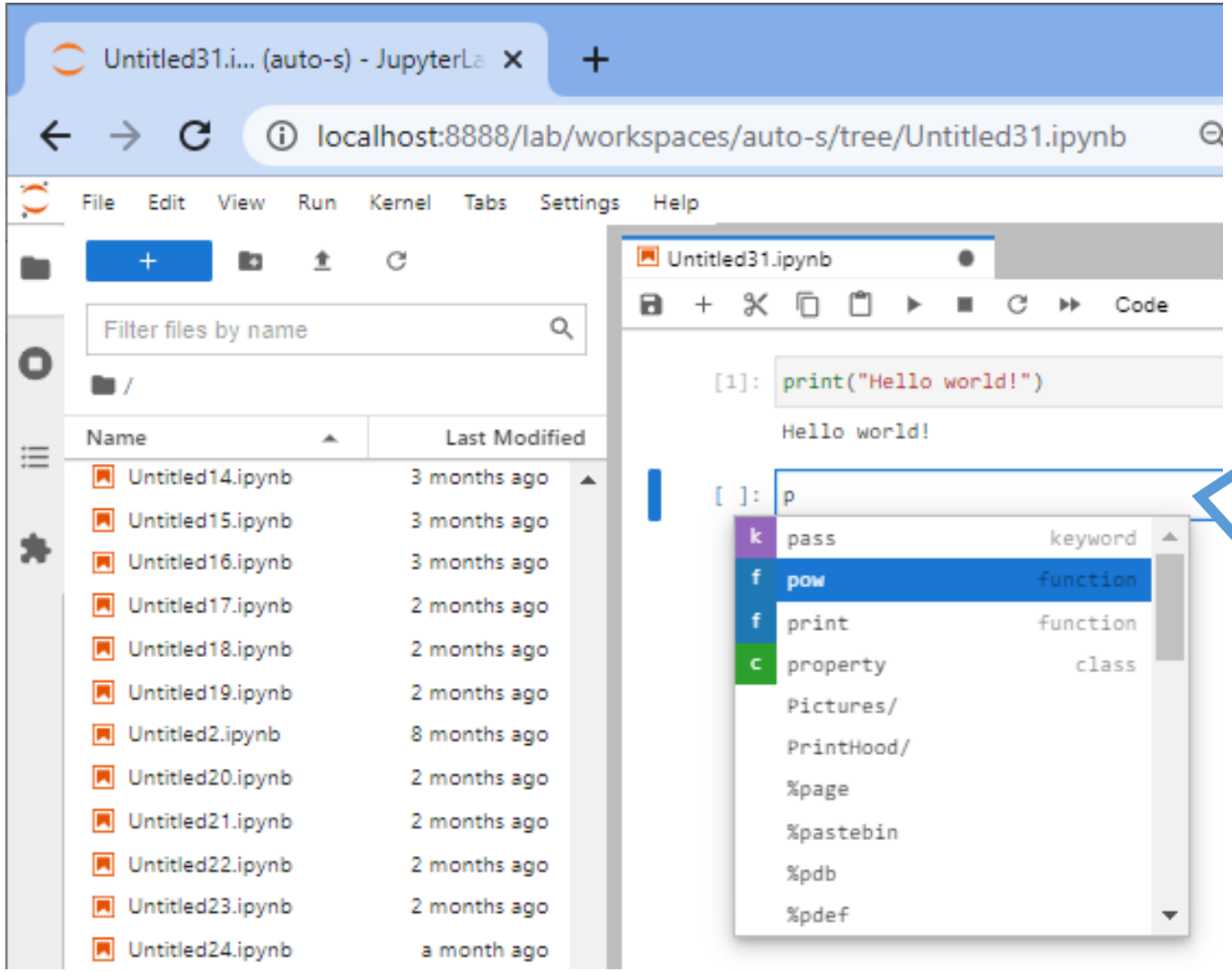
- Execute code cell-by-cell and see results instantaneously



SHIFT + ENTER to execute a code cell

Jupyter lab

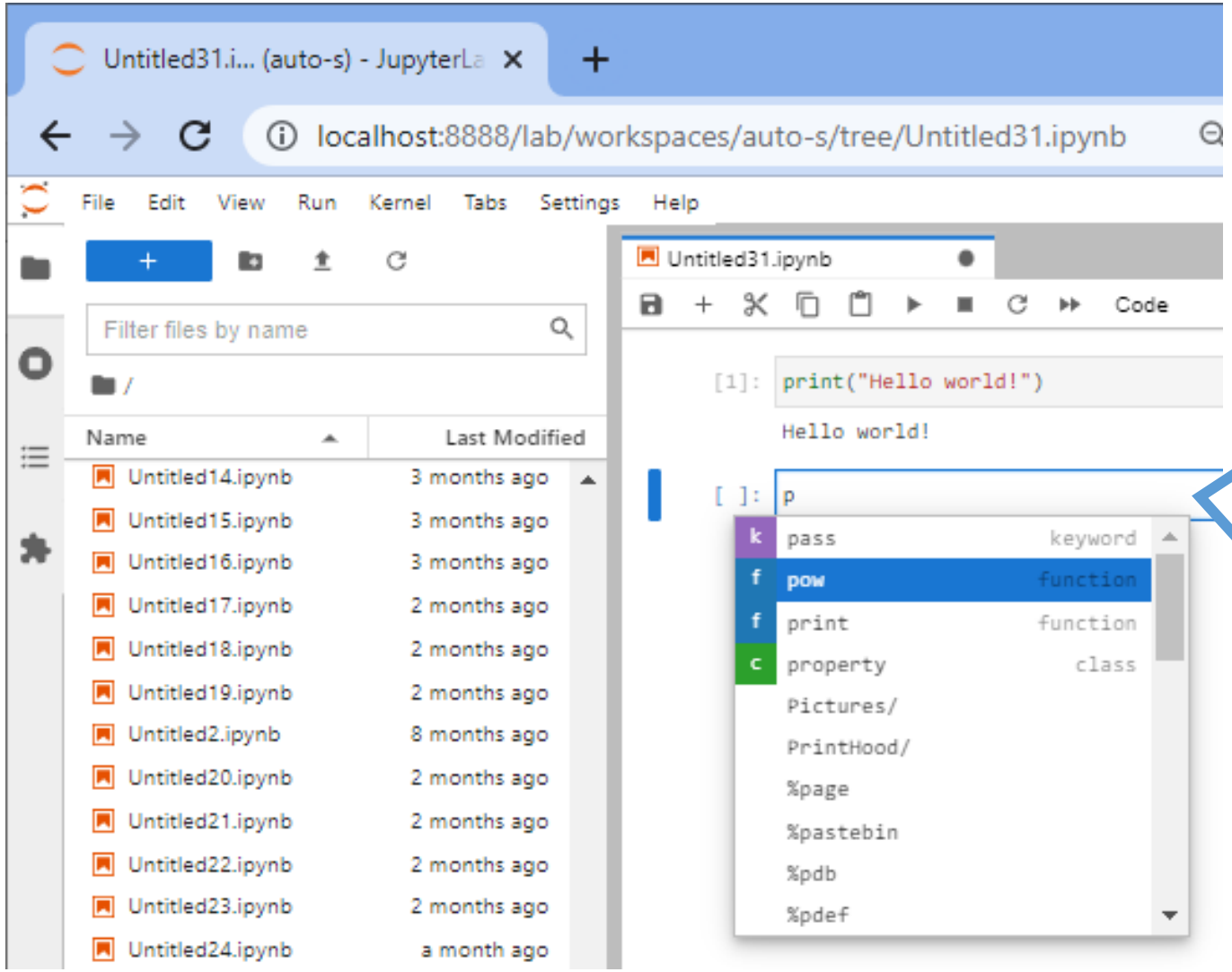
- Context-specific help, auto-completion



TAB
to open auto-completion

Jupyter lab

- Context-specific help, auto-completion



TAB
to open auto-completion

Jupyter lab

- Help / “docstrings”

Untitled31.i... (auto-s) - JupyterLa

localhost:8888/lab/workspaces/auto-s/tree/Untitled31.ipynb

File Edit View Run Kernel Tabs Settings Help

Filter files by name

/

Name	Last Modified
Untitled14.ipynb	3 months ago
Untitled15.ipynb	3 months ago
Untitled16.ipynb	3 months ago
Untitled17.ipynb	2 months ago
Untitled18.ipynb	2 months ago
Untitled19.ipynb	2 months ago
Untitled2.ipynb	8 months ago
Untitled20.ipynb	2 months ago
Untitled21.ipynb	2 months ago

Untitled31.ipynb

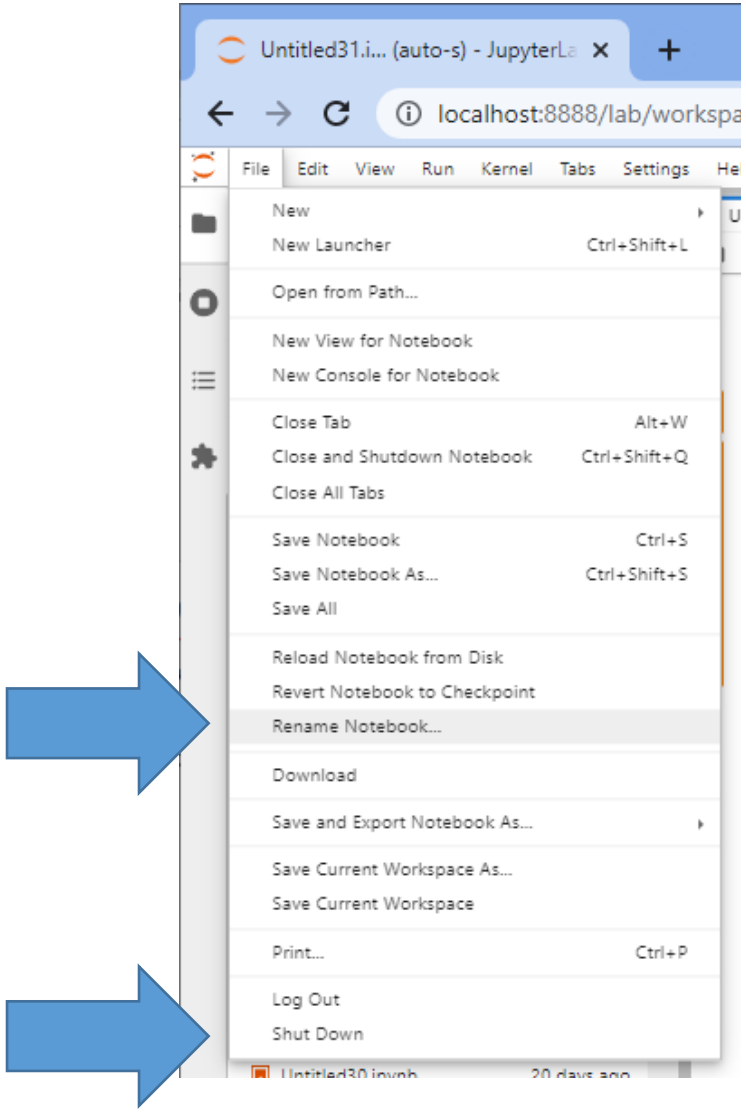
Code

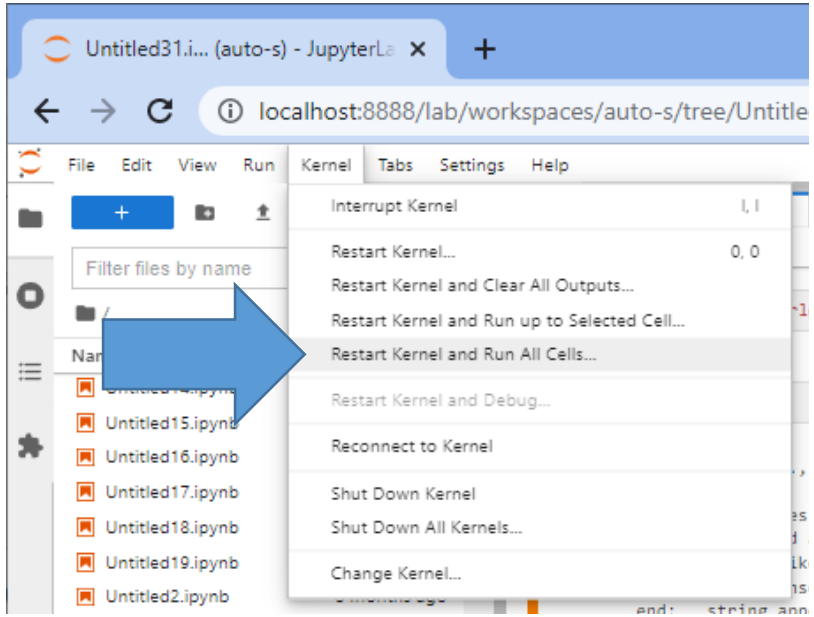
```
[1]: print("Hello world!")

Hello world!

[3]: print?

Docstring:
print(value, ..., sep=' ', end='\n', file=sys.stdout, flush=False)

Prints the values to a stream, or to sys.stdout by default.
Optional keyword arguments:
file:  a file-like object (stream); defaults to the current sys.stdout.
sep:   string inserted between values, default a space.
end:   string appended after the last value, default a newline.
flush: whether to forcibly flush the stream.
Type:      builtin_function_or_method
```

?
to read what a function does

Jupyter lab

- Saving / renaming / closing





Enforcing a “clean” execution state is important for ensuring reproducibility and repeatability

Live demo: create workflow notebook using napari

- Example: https://t.ly/U_on