

Introduction to the Napari Assistant

Robert Haase

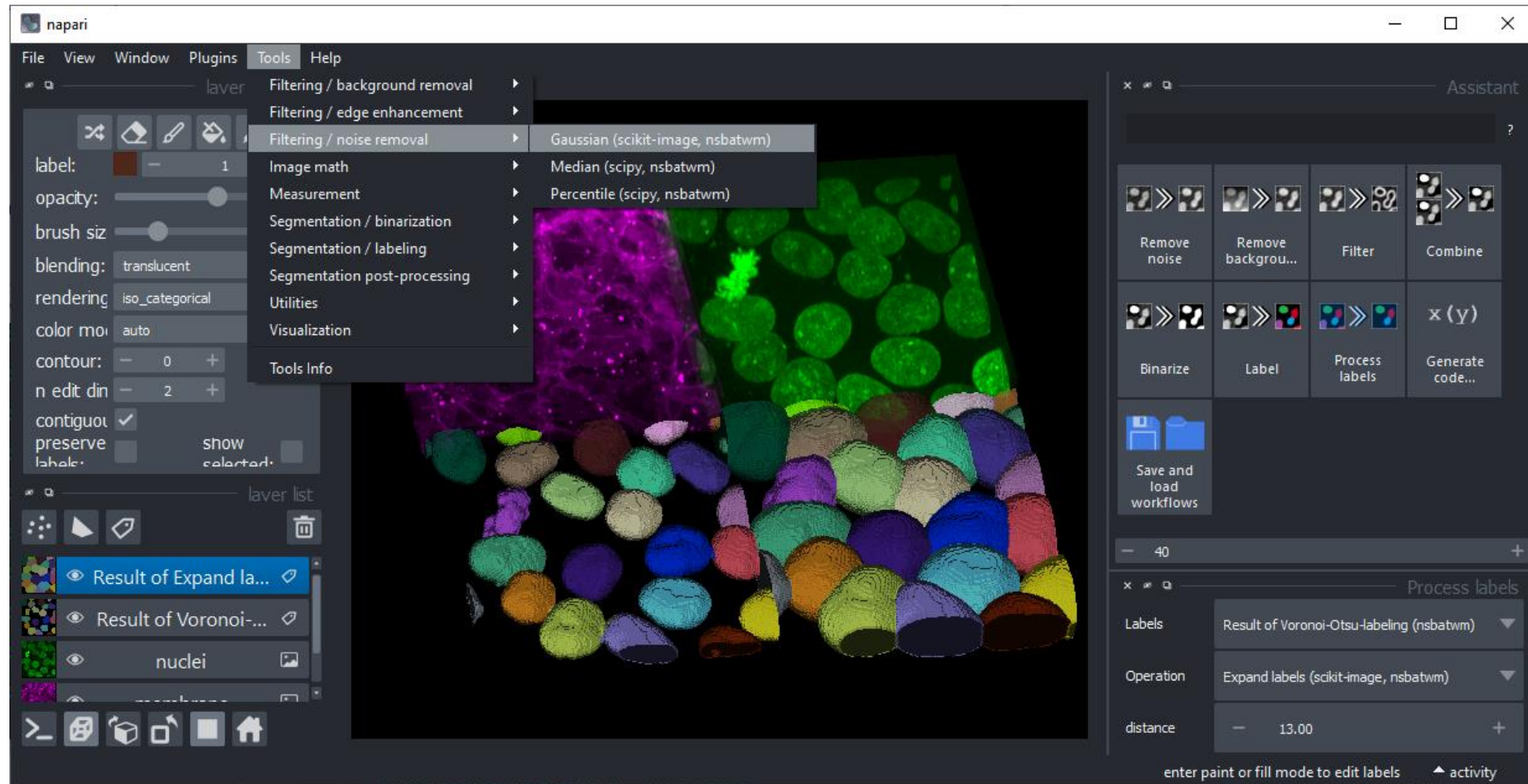
Reusing material from

Marcelo Leomil Zoccoler and Ryan Savill,
Physics of Life, TU Dresden

August 2023

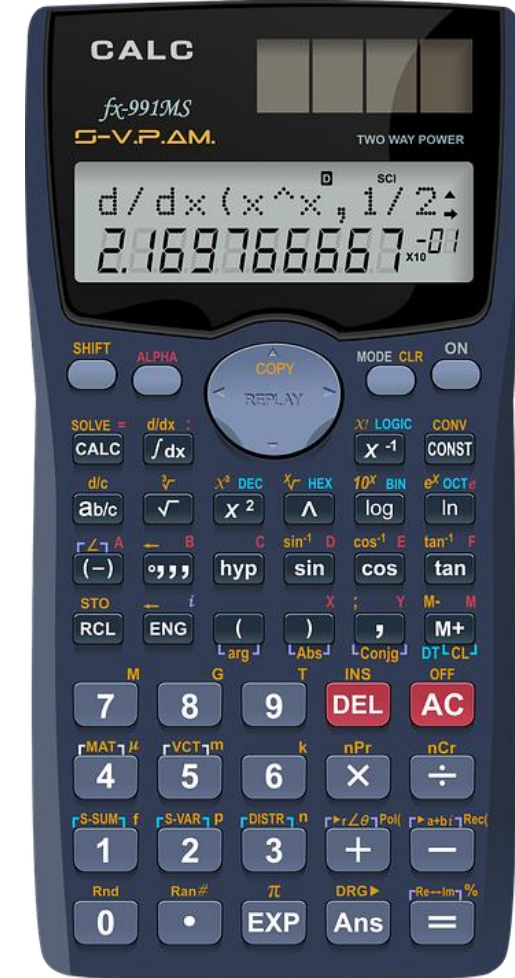
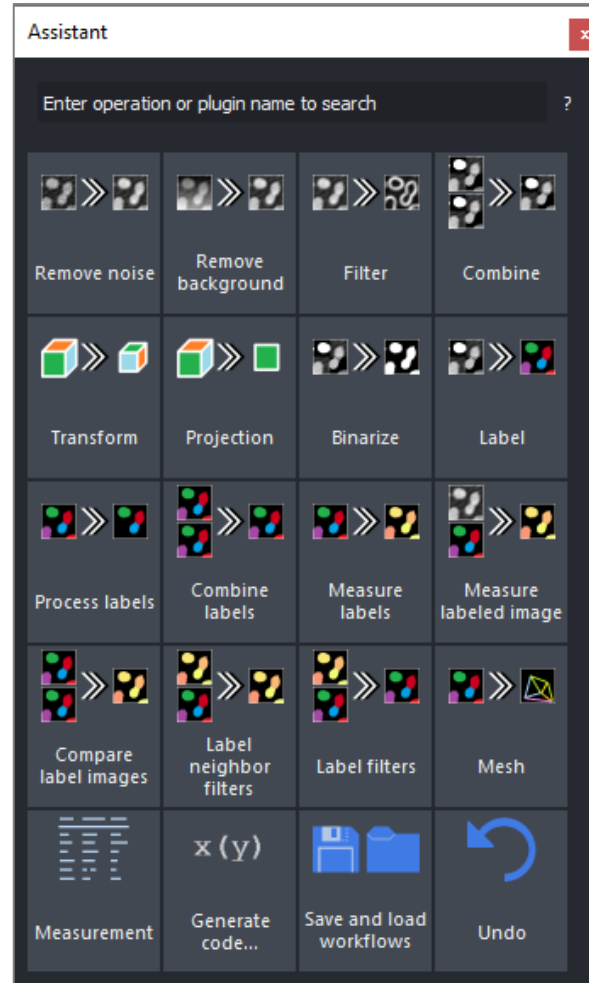
Napari, segment blobs and things with membranes!

- Filtering,
- thresholding,
- spot detection,
- seeded watershed

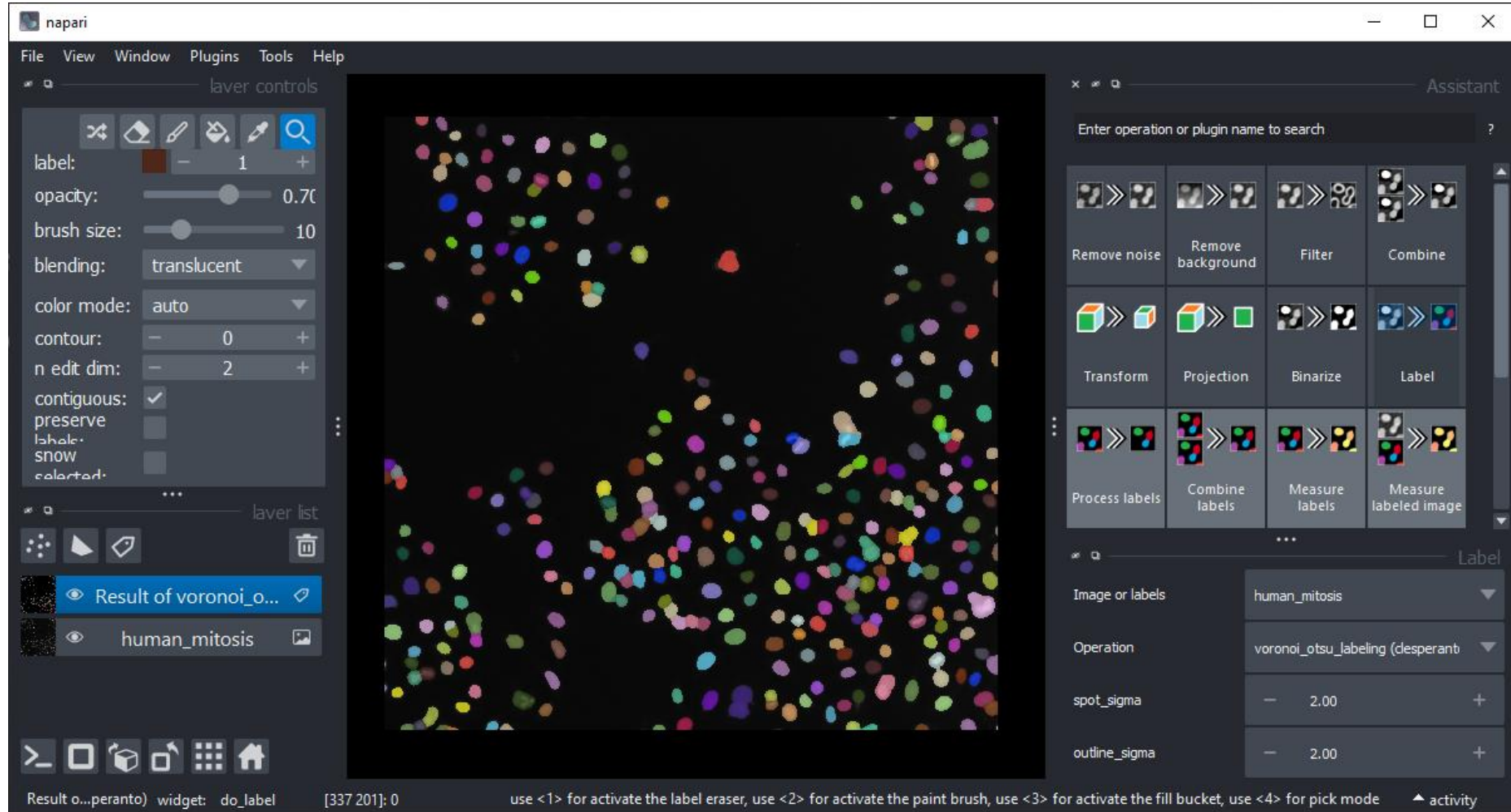


The Napari Assistant

- A pocket-calculator-like interface to build image analysis workflows



The Napari Assistant



Viewer
controls
(Napari core)

Image
Analysis
(Napari Assistant)

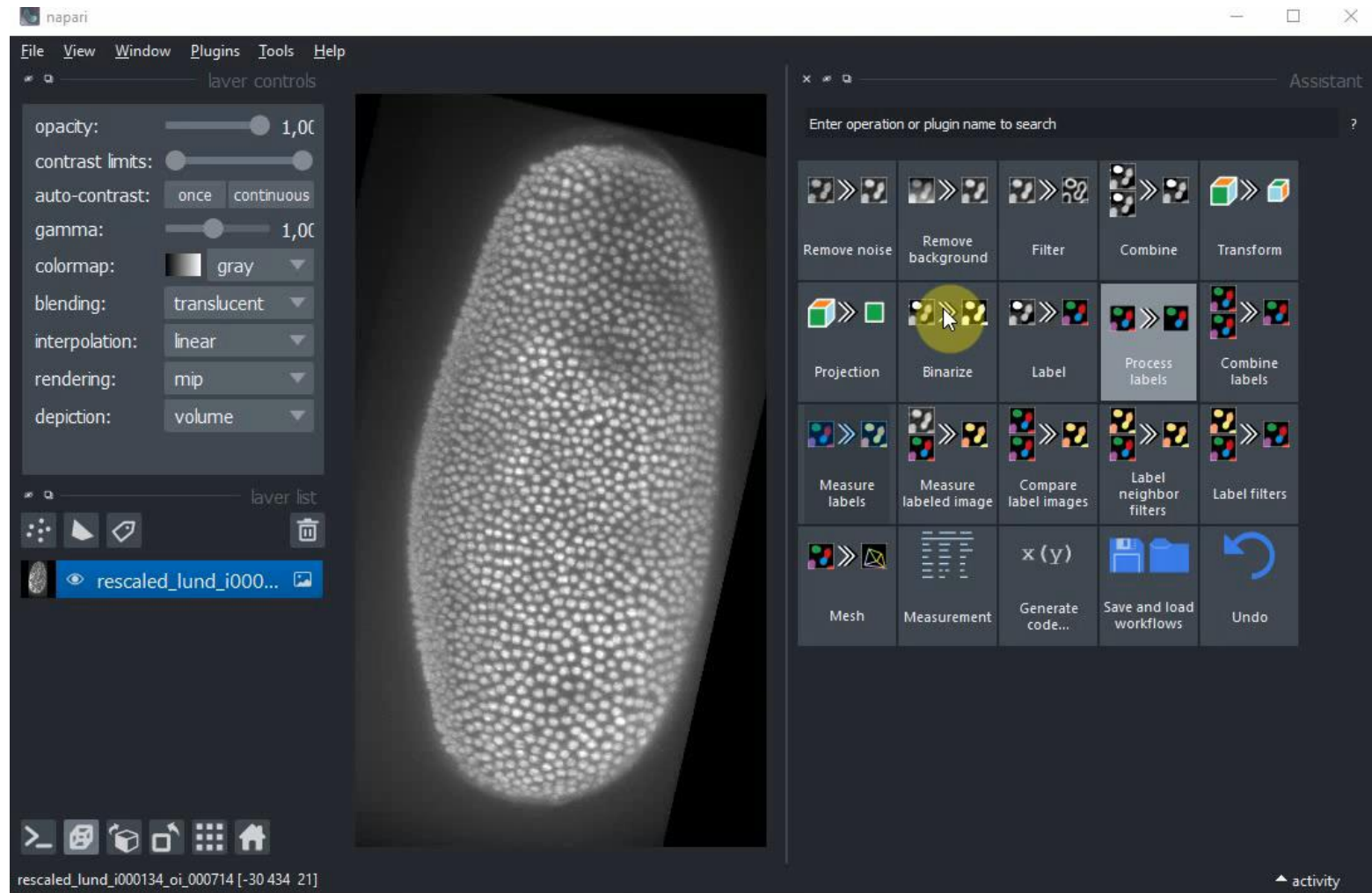
The Napari Assistant

- Classical image processing operations + advanced tools
- Saving&loading supported
- Undo [redo]
- Hints for next steps
- ...

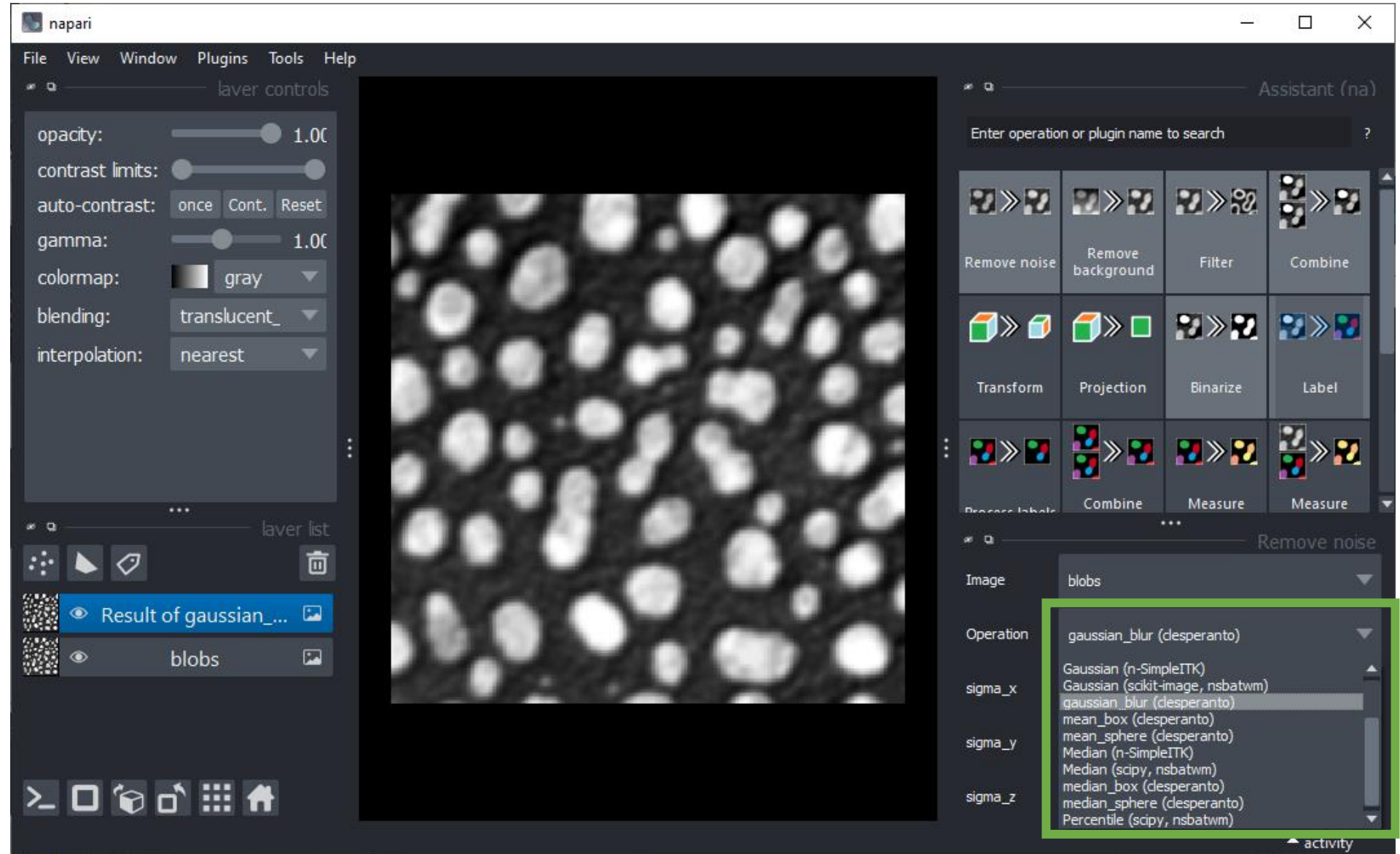
Big thanks to:



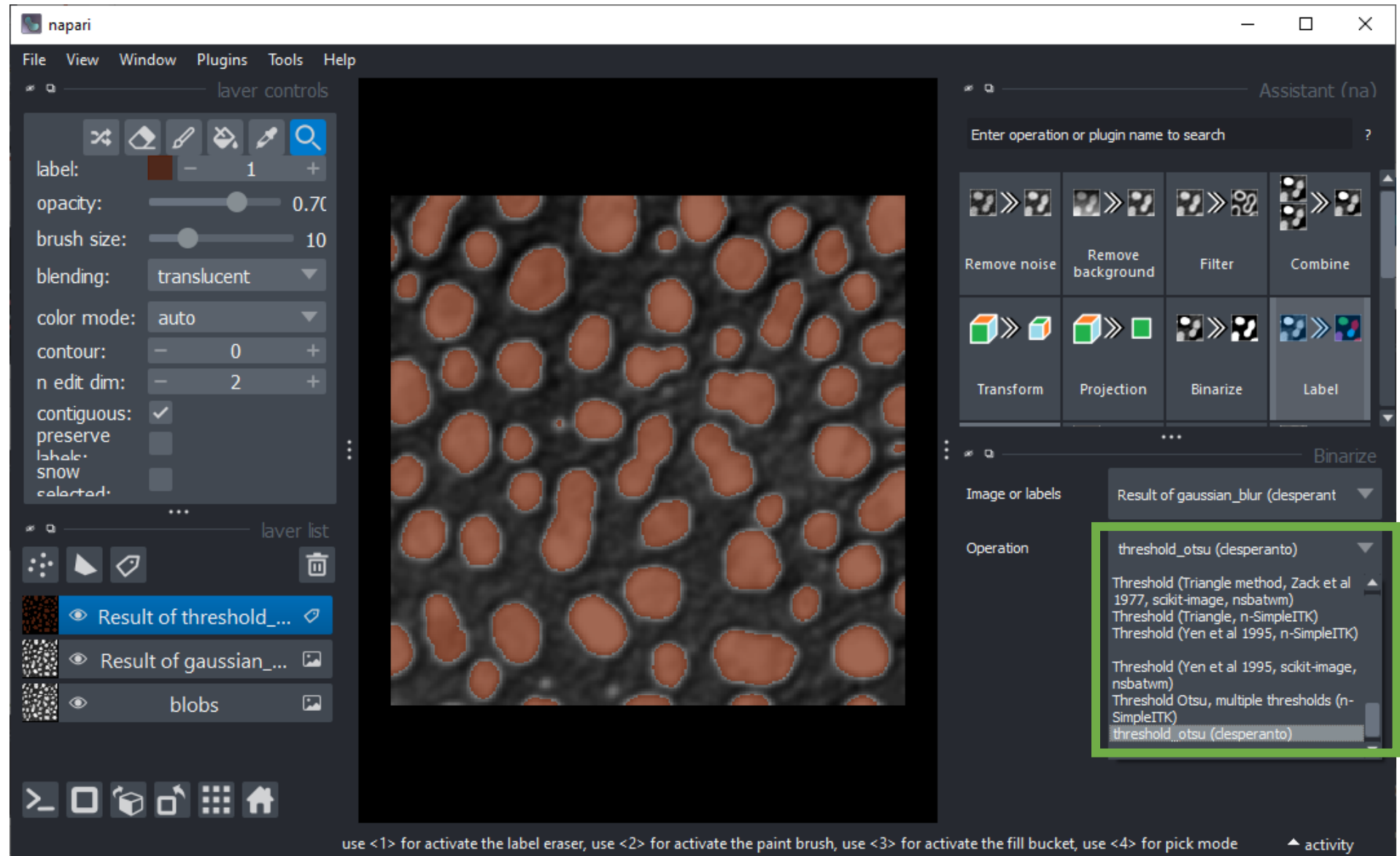
Ryan Savill
(now at MPI-CBG) @RyanSavill4



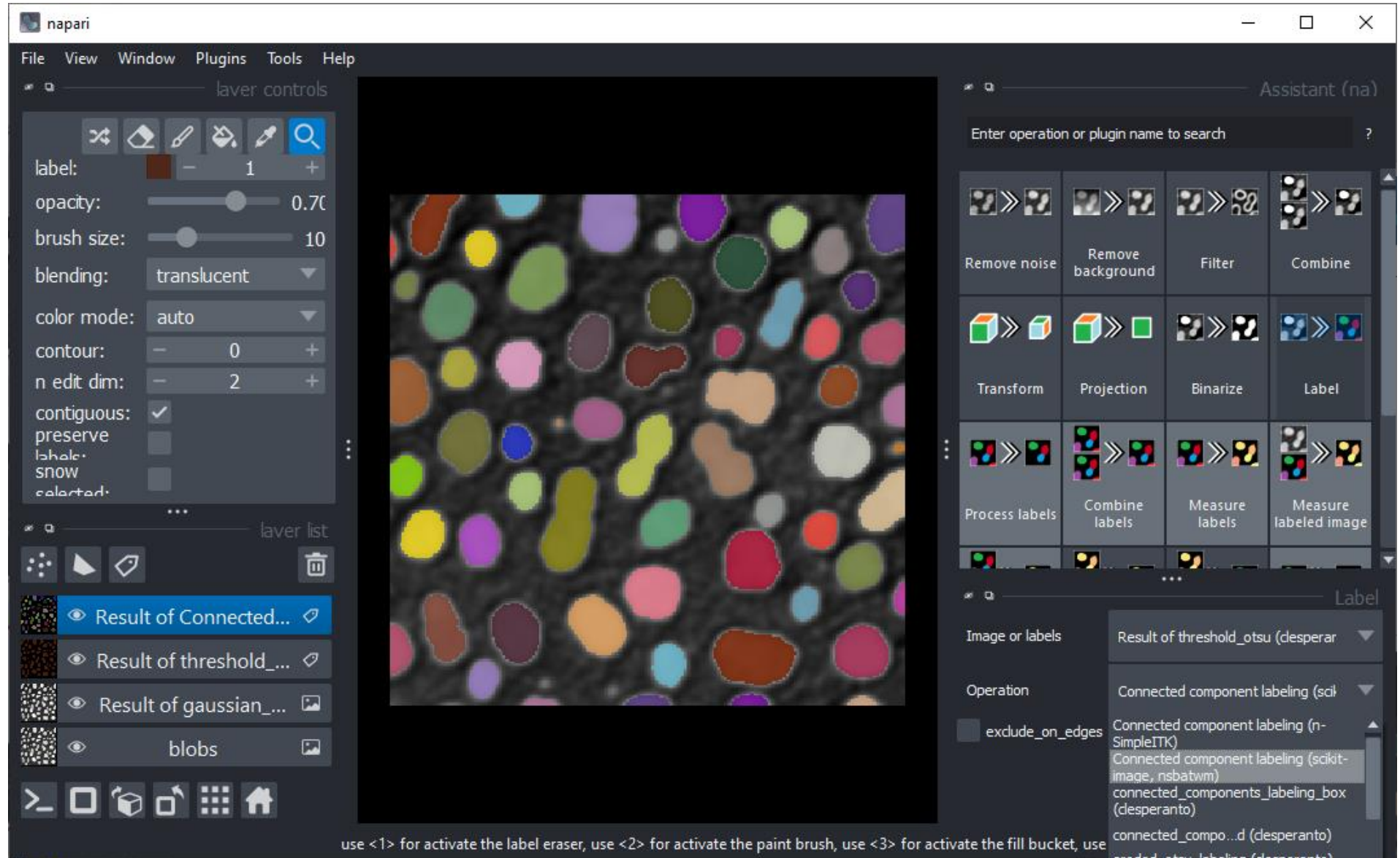
- Try different algorithms, e.g. for removing noise
- Find them in the pulldown



- Try different binarization algorithms

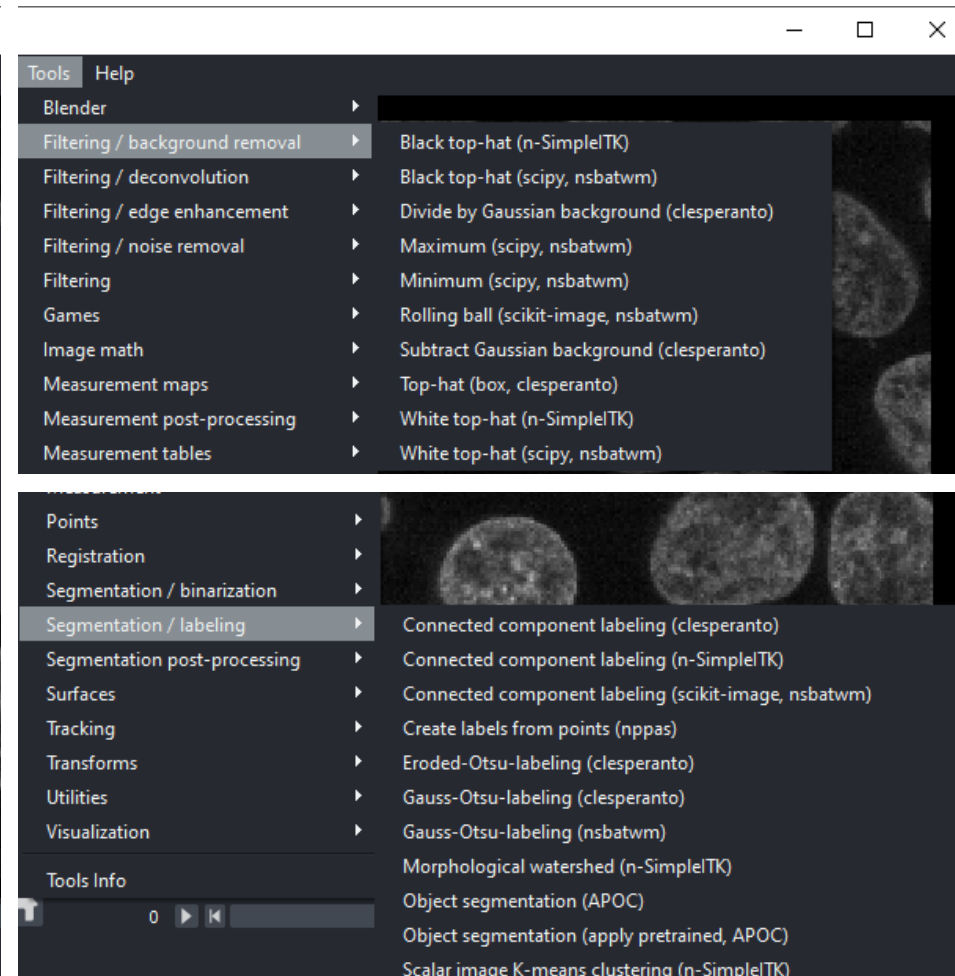
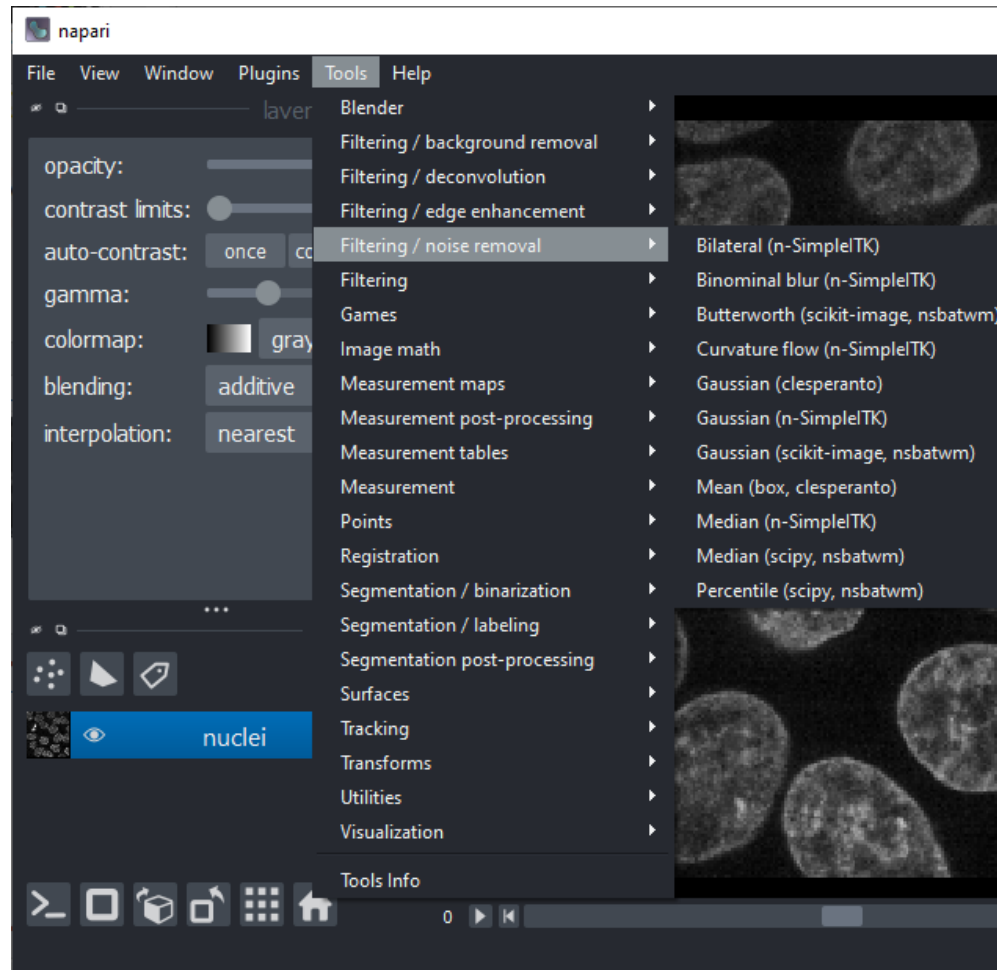


- Try different labeling algorithms

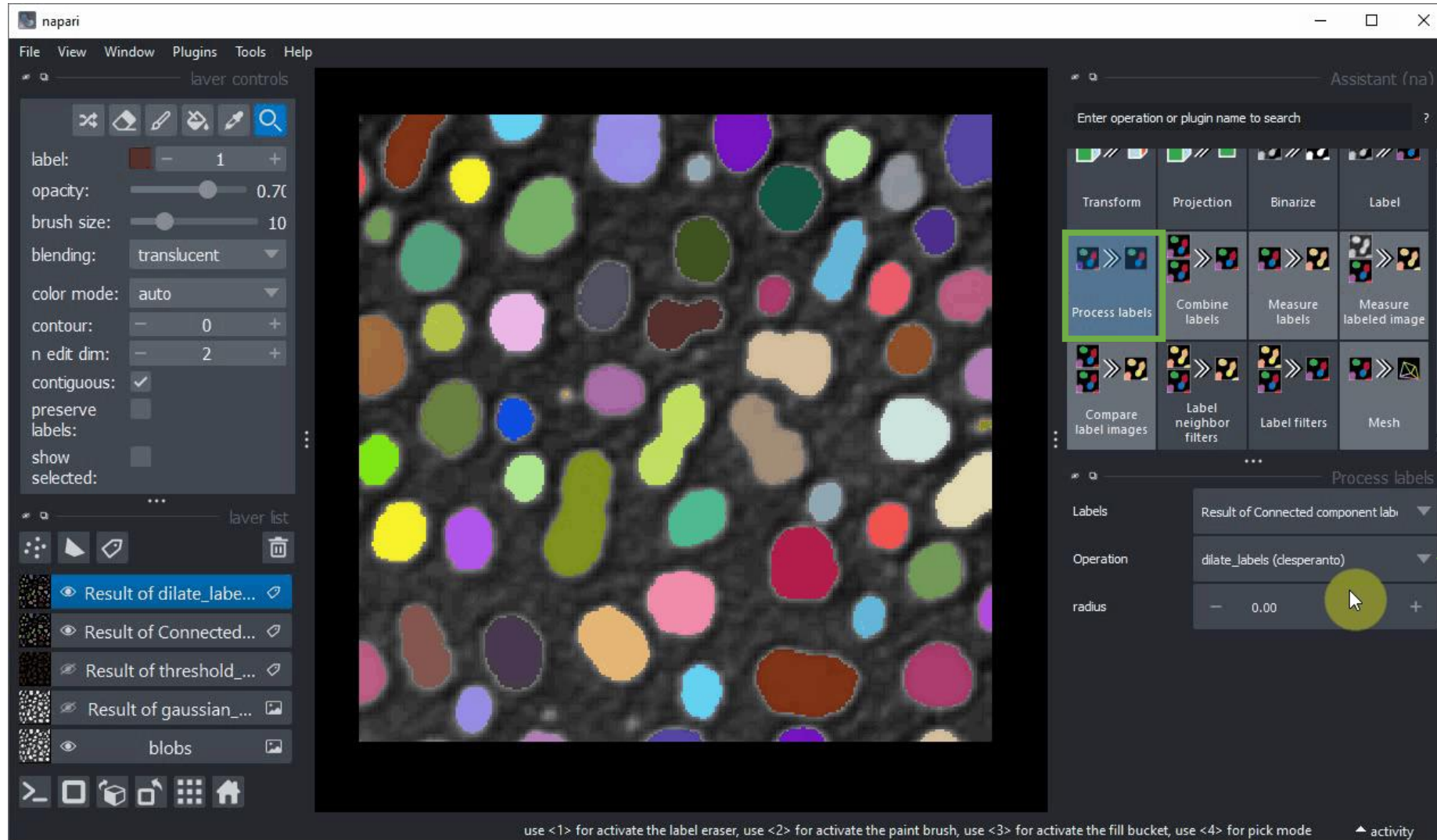


The Tools menu

- Also check out the Tools > Segmentation / labeling menu
- Organized in categories

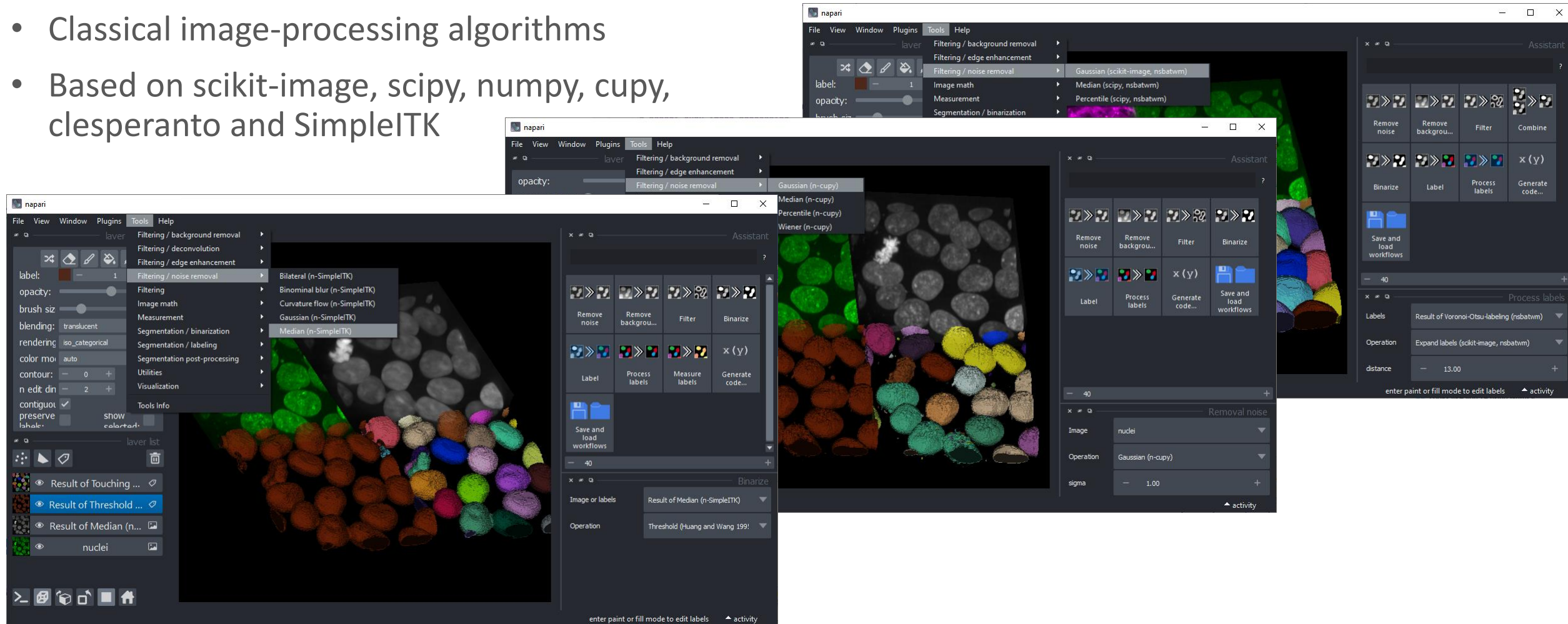


- In Napari Assistant: Process labels



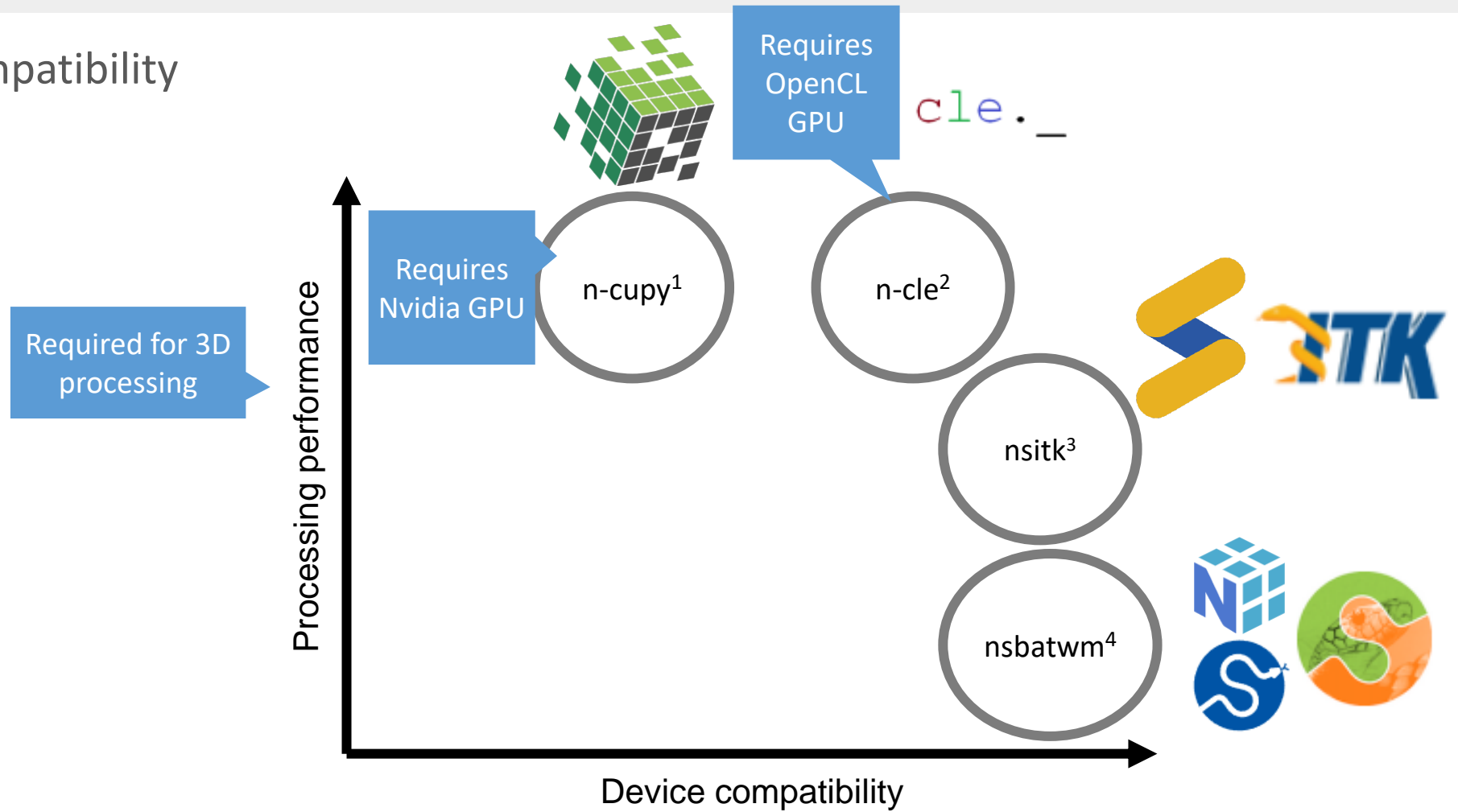
Napari-Assistant compatible plugins

- Classical image-processing algorithms
- Based on scikit-image, scipy, numpy, cupy, clesperanto and SimpleITK



Napari-Assistant compatible plugins

- Performance versus compatibility



1 <https://www.napari-hub.org/plugins/napari-cupy-image-processing>
2 <https://www.napari-hub.org/plugins/napari-pyclesperanto-assistant>
3 <https://www.napari-hub.org/plugins/napari-simpleitk-image-processing>
4 <https://www.napari-hub.org/plugins/napari-segment-blobs-and-things-with-membranes>

Browse operations

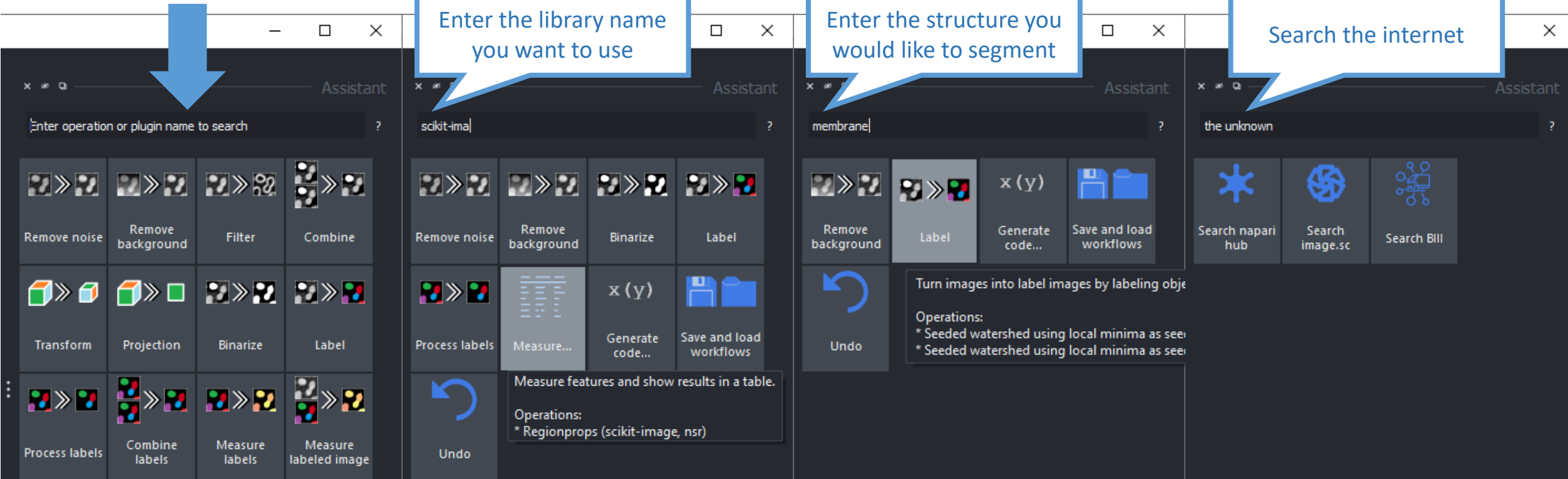
- Use the search...

This only works if developers documents their plugins well ;-)

Enter the library name you want to use

Enter the structure you would like to segment

Search the internet



The image displays four sequential screenshots of the Napari Assistant search interface, illustrating different search methods and their results.

- First Screenshot:** Shows the search bar with the placeholder text "Enter operation or plugin name to search". A large blue arrow points down to the search bar.
- Second Screenshot:** The search bar contains "scikit-ima". The results show a grid of operations: Remove noise, Remove background, Filter, Combine, Transform, Projection, Binarize, Label, Process labels, Measure..., Generate code..., and Save and load workflows. A tooltip for "Measure..." is visible, stating: "Measure features and show results in a table. Operations: * Regionprops (scikit-image, nsr)".
- Third Screenshot:** The search bar contains "membrane". The results show a grid of operations: Remove background, Label, Generate code..., and Save and load workflows. A tooltip for "Label" is visible, stating: "Turn images into label images by labeling objects. Operations: * Seeded watershed using local minima as seeds, * Seeded watershed using local minima as seeds".
- Fourth Screenshot:** The search bar contains "the unknown". The results show three buttons: "Search napari hub", "Search image.sc", and "Search Bili".

The Napari Hub

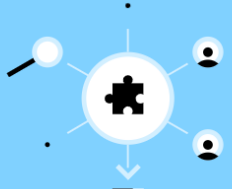
- Search engine for napari plugins

napari hub | search

napari-hub.org

napari hub About FAQ

Discover, install, and share napari plugins



- Discover plugins that solve your image analysis challenges
- Learn how to install into napari

Share your image analysis tools with napari's growing community

Search for a plugin by keyword or author

SORT

☐ Plugin name

Browse plugins: 227

napari hub | search

napari-hub.org/?search=cell+segmentation&sort=relevance&page=1

Search for a plugin by keyword or author

cell segmentation

SORT

☒ Relevance

☐ Plugin name

☐ Recently updated

☐ Newest

FILTER BY CATEGORY [Clear all](#)

Workflow step

Image modality

FILTER BY REQUIREMENT [Clear all](#)

Supported data

Authors

Browse plugins: 26

napari-cellseg3d

plugin for cell segmentation

Cyril Achard, Maxime Vidal, Jessy Lauer, Mackenzie Mathis

...3D: a napari plug-in for direct 3D cell segmentation with deep learning A napari plug...

Workflow step: Image Segmentation

Image modality: Fluorescence microscopy

vollseg-napari

Irregular cell shape segmentation using VollSeg

Varun Kapoor

...ollSeg, a deep learning based 2D and 3D segmentation tool for irregular shaped cells. VollSe...

Workflow step: Image Segmentation

napari hub | search

napari-hub.org/?search=feature+extraction&sort=relevance&page=1

Search for a plugin by keyword or author

feature extraction

SORT

☒ Relevance

☐ Plugin name

☐ Recently updated

☐ Newest

FILTER BY CATEGORY [Clear all](#)

Workflow step

Image modality

FILTER BY REQUIREMENT [Clear all](#)

Supported data

Authors

Browse plugins: 8

napari-features

extensible, general-purpose feature extraction

Allen Goodman

... An extensible, general-purpose feature extraction plug-in for the Napari image viewer. Fe...

version 0.1.4

release date 24 August 2021

license MIT

python version >=3.7

operating system All

napari-blob-detection

Detects blobs in images

Andy Sweet, Chi-Li Chiu

...s to labels, users can leverage feature extraction functions that are available to labels ...

version 0.0.2

release date 22 April 2022

license BSD-3-Clause

python version >=3.8

operating system All

napari-skimage-regionprops

A regionprops table widget

version 0.5.3

release date 10 July 2022

license BSD-3-Clause

python version >=3.8

The Napari Hub

- Allows to trace napari-plugins in more detail

napari-skimage-regionprops
[napari-skimage-regionprops](#)

A regionprops table widget plugin for napari

Marcelo Zoccoler, Robert Haase

[View project data](#)

Description Activity **NEW!**

Workflow step: [Object feature extraction](#) > Shape features extraction > [Object feature extraction](#)

license **BSD-3**

pypi **v0.10.1**

python **3.8 | 3.9 | 3.10**

Usage

14,742 installs since publicly released over **2 years ago**

653 installs in past 30 days

Maintenance

297 commits since plugin repo created over **2 years ago**

Latest commit made over **2 months ago**

[Learn more about where we get this data.](#)

Monthly installs in past year

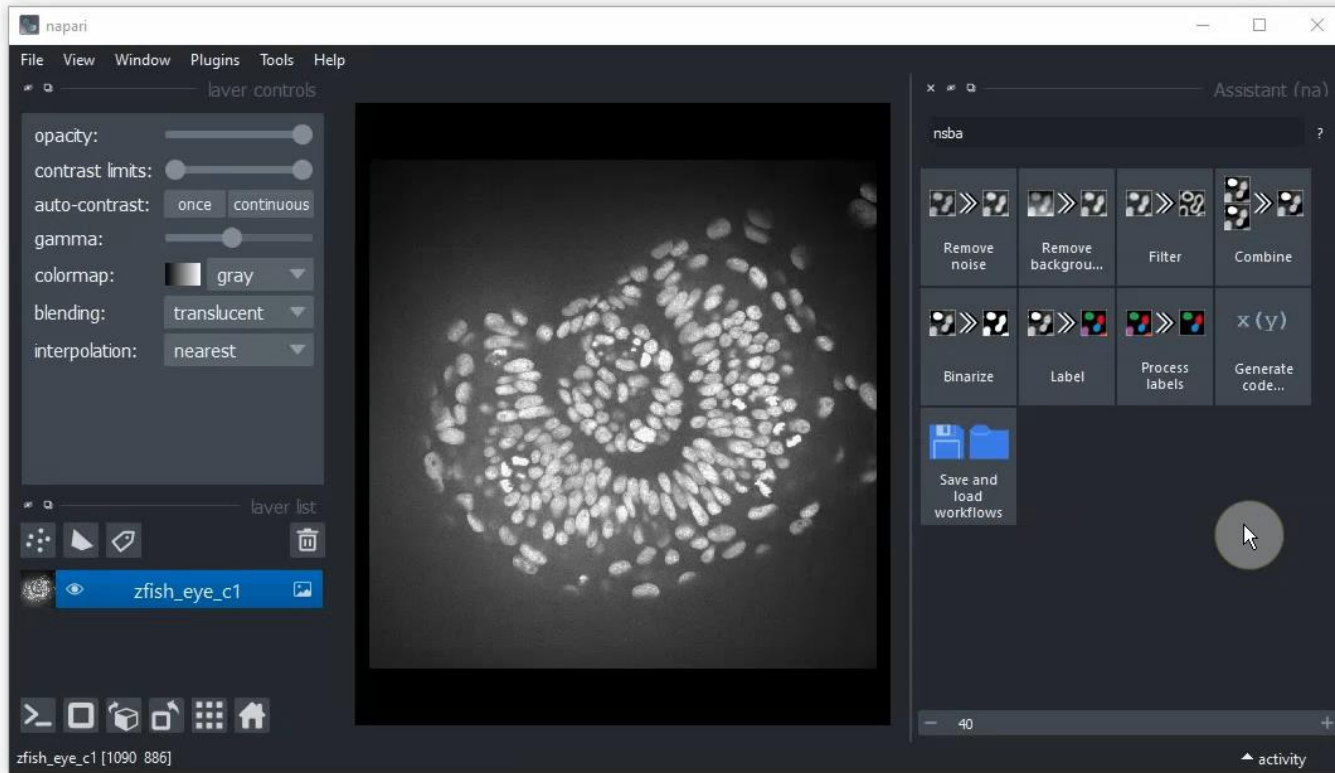
Monthly commits in past year

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Export code to Jupyter Notebooks

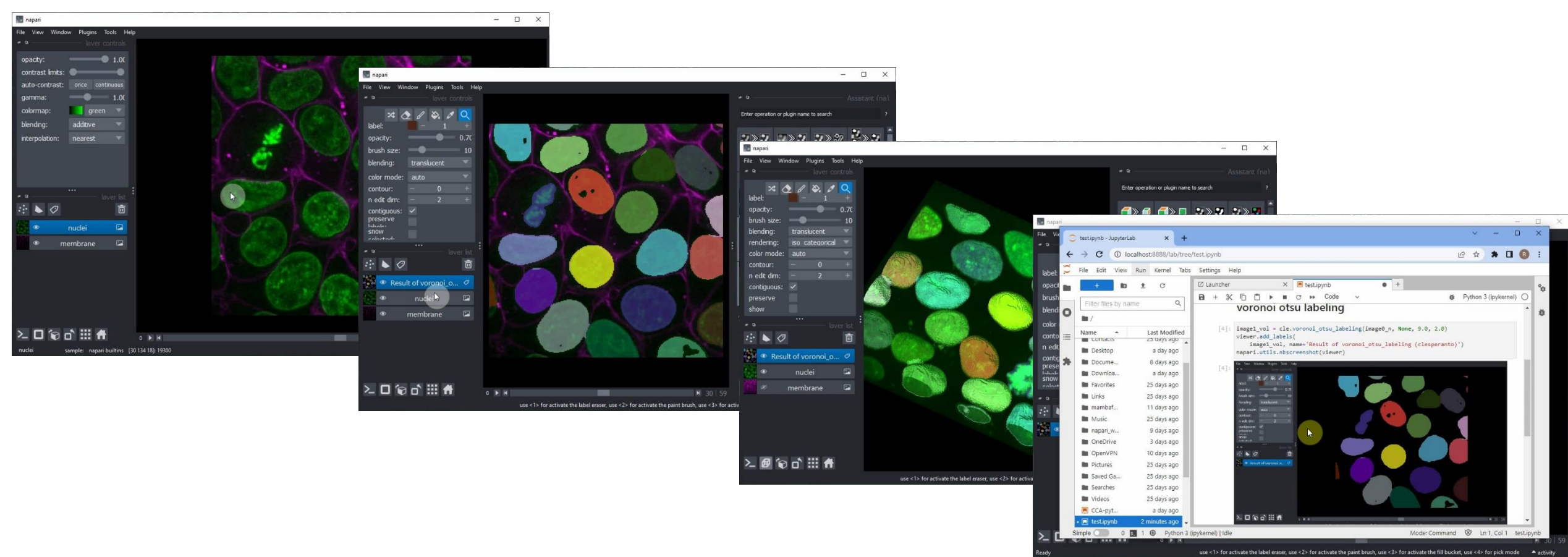


<https://github.com/haesleinhuepf/napari-assistant>

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

Exercise

- Use the Napari Assistant to generate a Jupyter Notebook



Exercise

- Follow the online instructions
- https://biapol.github.io/PoL-BioImage-Analysis-TS-Early-Career-Track/day1e_image_processing/napari-assistant.html
- https://biapol.github.io/PoL-BioImage-Analysis-TS-Early-Career-Track/day1e_image_processing/notebook_export.html

The Napari Assistant

The Napari Assistant is a plugin for napari that allows you setting up an image processing workflow.

This tutorial is also available as video [napari-assistant.mp4](#).

Start napari from the command line like this:

```
conda activate devbio-napari-env
napari
```

Within the Assistant panel, click on the Remove noise button.

Generating Jupyter Notebooks from the Napari Assistant

After setting up a workflow using the Napari Assistant, we can export Python code, e.g. as Jupyter Notebook.

This tutorial is also available as video [export_notebooks.mp4](#)

In the Assistant panel, click on the Generate Code... button and the Export Jupyter Notebook using Napari menu.

Acknowledgements



BiAPoL team

- Mara Lampert
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- Ryan George Savill
 - Laura Zigutyte

Networks



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Zuckerberg
Initiative** 

