

# JIPipe: Designing automated image analysis pipelines without programming

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Java Image Processing Pipeline (JIPipe, <https://www.jipipe.org/>) is a plugin for ImageJ [1] that allows to create image processing pipelines without a script language. Instead users only have to design a flow-chart by connecting processing steps (nodes) to each other in a visual programming language.

- ✓ **600+ commonly used functions from ImageJ and popular plugins**
- ✓ **Intuitive and modern user interface**
- ✓ **Powerful annotation system for tracking metadata**
- ✓ **Standardized & automated output to hard drive**

## Image analysis powered by ImageJ

JIPipe integrates plenty of image analysis functions from ImageJ, such as image import, thresholding, contrast enhancement, edge detection, or extracting measurements. Additionally, we provided support for popular plugins including ...

- ✓ **Bio-Formats**
- ✓ **OMERO**
- ✓ **MorphoLibJ**
- ✓ **FeatureJ**
- ✓ **Multi-Template-Matching**

To allow even greater flexibility, users can utilize ImageJ Macro, Python, and R script nodes to write or re-use custom code inside the JIPipe environment.

## GPU processing and deep learning

JIPipe allows easy utilization of modern graphics hardware by including all functions provided by the powerful CLIJ2 [2] library for GPU processing. JIPipe's advanced data management automatically takes care of all technical details like converting images.

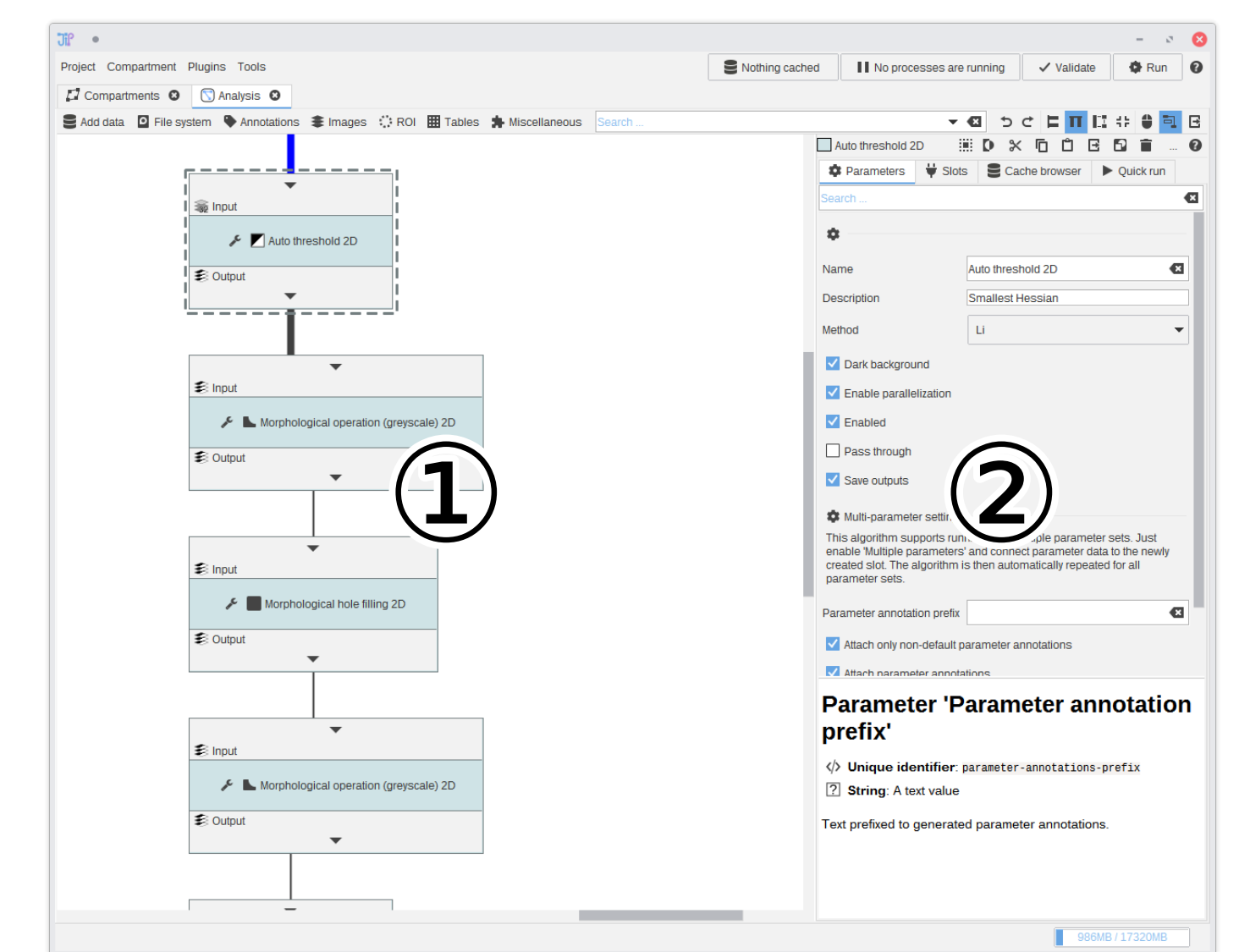
Deep Learning has become a commonly used tool in image analysis. To allow anyone to make use of this technology, JIPipe includes Deep Learning libraries like Cellpose [3] - with full support for all functions and parameters, including training.

More generalized support for deep learning is provided via our own interface dltoolbox that is based on Tensorflow.

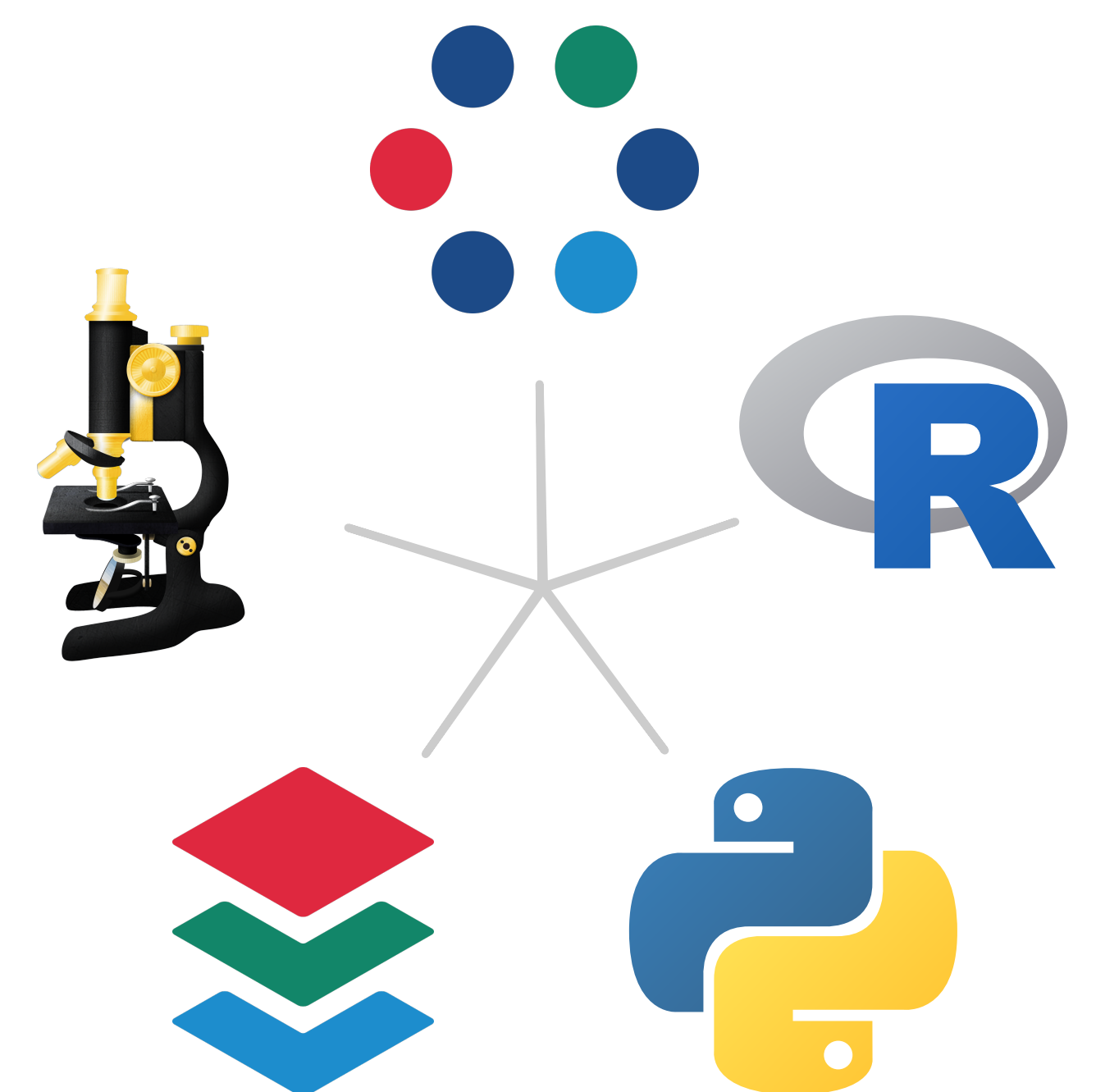
## More features via plugins

JIPipe already provides many features, such as nodes for table processing, plotting, sorting and distributing data, user interaction during the pipeline, and more.

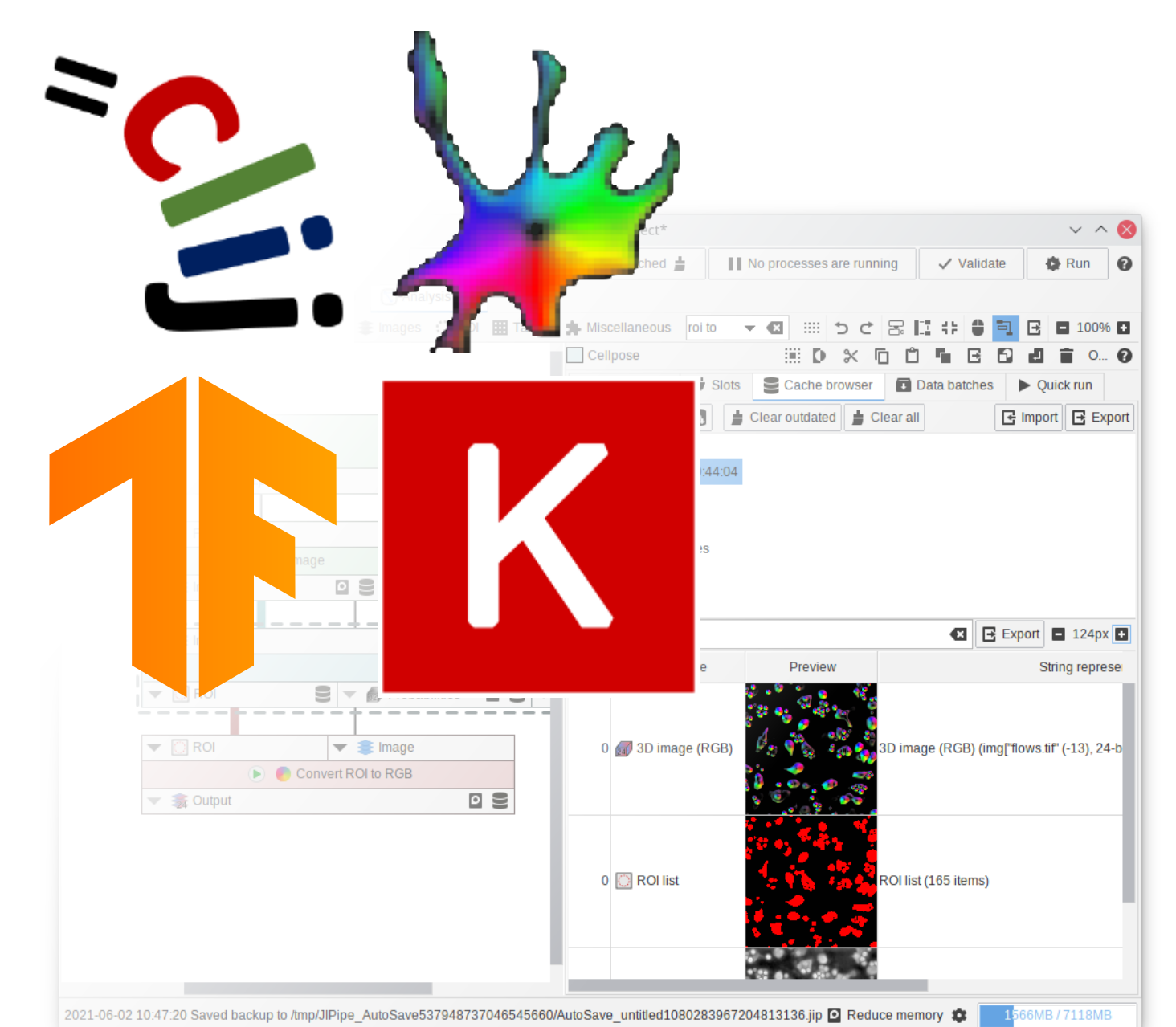
Additional features can be easily developed in Java as ImageJ plugin, or created within a GUI tool that allows anyone to create new nodes. These are also automatically available from inside ImageJ, as JIPipe exports all its functions to ImageJ.



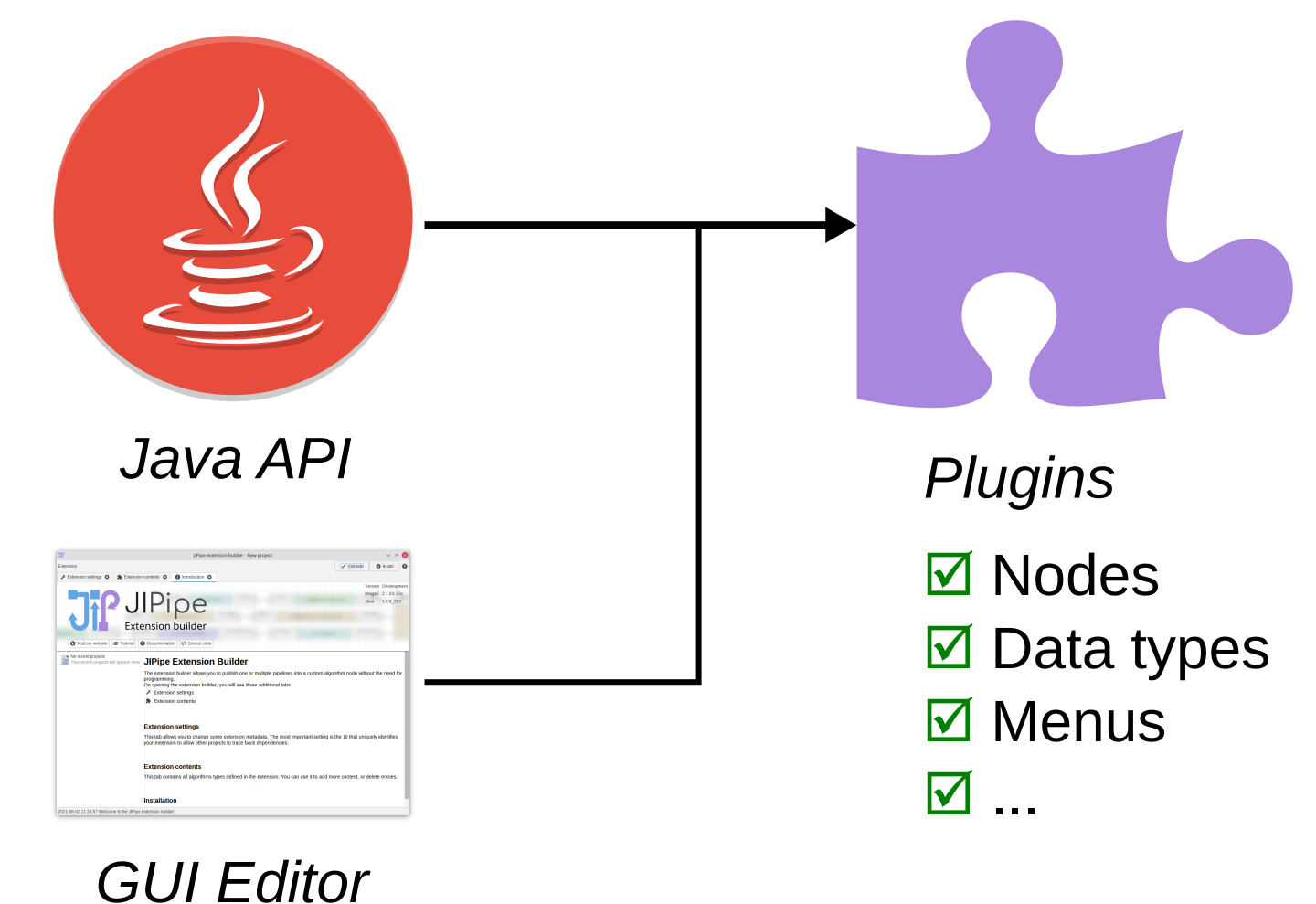
JIPipe comes with its own graphical user interface that allows easy access to all functions. ① The graph editor to build the flow chart ② All settings are shown on the right-hand side



JIPipe already integrates many popular software tools like ImageJ and Python into one easy-to-use environment.



JIPipe comes pre-packaged with support for GPU and Deep Learning tools like CLIJ and Cellpose.



JIPipe can be easily extended with plugins.

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### References

- [1] Rueden *et al.* 2017. *BMC Bioinformatics*. 18(1): 1-26.
- [2] Haase *et al.* 2020. *Nat Methods*. 17(1): 5-6.
- [3] Stringer *et al.* 2021. *Nat Methods*. 18(1): 100-106.