

JIPipe: Designing automated image analysis pipelines without programming


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JIPipe

Java Image Processing Pipeline (JIPipe) 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**.

- ✓ 500+ 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



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.

Image analysis powered by ImageJ

JIPipe integrates many image analysis functions, like image import, thresholding, contrast enhancement, edge detection, or extracting measurements from ImageJ and allows them to be run in a batch environment. Additionally, we included popular plugins like ...

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

To allow even greater flexibility, you 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.

A more generalized library for Deep Learning using **Keras** and **Tensorflow** is currently being developed, as well.

More features via plugins

JIPipe already provides many features, like the table processing algorithms, 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 can be easily extended with plugins.

References:

- [1] Rueden C. T., Schindler J., Hiner M. C., Dalrymple B. E., Hader A. E., Aertse E. T., & Elicei K. W. (2017) ImageJ2: ImageJ for the next generation of scientific image analysis. *bioRxiv*, 161778.
- [2] Hees R., Roper L. A., Reinhardt P., Schmidt D., Döllner A., Schmitz U., & Meinen E. W. (2020) CLIJ2: GPU-accelerated image processing for everyone. *Nature methods*, 17(2), 1-6.
- [3] Stringer C., Wang T., McQuinn M., & Pachitariu M. (2021) Cellpose: a generalized algorithm for cellular segmentation. *Nature Methods*, 18(1), 1-10.

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