

Introducing the ImageJ OPS framework

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With increasing image sizes and modalities, scientists developing image processing and analysis software face a range of challenges: the software should be easy to use, easy to extend, easy to maintain, it should handle large amounts of data and it should be fast. Many individual developers attempted to tackle these challenges at a low level by developing reusable, generic frameworks, in general addressing up to two of the aforementioned challenges. The ImageJ OPS framework, still in an early stage, is already easy to use, extend and maintain, can handle data of almost arbitrary sizes and it sports a transparent optimization framework that makes its operation fast. Being based on the SciJava common framework, it is flexible enough to allow for already-existing algorithms to be accelerated simply by copying files that replace selected operations with machine-specific optimal ones. For example, a deconvolution algorithm making use of the Fourier Transform operation can run faster by providing a separate GPU-accelerated Fourier Transform operation – without touching the deconvolution algorithm at all. The architecture of ImageJ OPS was designed by three research groups, ensuring that it addresses a wide range of needs and that it is viable in the long term. As a further bonus, the ImageJ OPS framework is implemented in pure Java guaranteeing maximal interoperability, platform-independence and tapping into a vast number of software developers already familiar with that language. We predict that ImageJ OPS will be the standard framework to process and analyze images in bio-image informatics