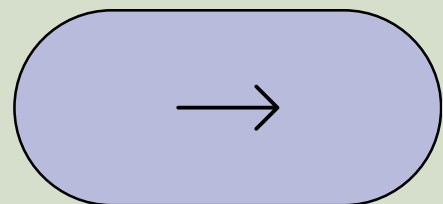ZUZANNA SMEKTAŁA

The ImageJ ecosystem

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What is ImageJ?

ImageJ is a widely-used open-source software that allows users to visualize, inspect, quantify, and validate scientific image data

→

Novel imaging modalities offer enhanced resolution, specificity, and coverage and have contributed to many of the tremendous biological advancements over the past several decades

Biological studies

- quantifying the proximity of fluorescent-labeled proteins

- tracking cell fates over time

- automating cell counting

- tracking invading cancer cells

- collecting whole-slide information

- quantifying and characterizing cells, such as microglia, within the brain

- registering multiview light sheet fluorescence microscopy datasets to study development

The ImageJ ecosystem lends utility to a **wide range of users** with varying programming expertise

ImageJ ecosystem can be found in freely-accessible GitHub repositories

Individuals may modify any particular component of the ImageJ ecosystem

ImageJ's capabilities

from common tasks such as opening images of various formats, annotating and processing images, and executing simple workflows on images, to advanced projects involving visualizing and analyzing large image data and implementing machine learning algorithms

- Opening and annotating images
- Common image analysis techniques: Segmentation, tracking, and registration
- Scripting and plugins
- Handling big data and specialized plugins for analysis
- Machine learning

Opening and annotating images

JPEG
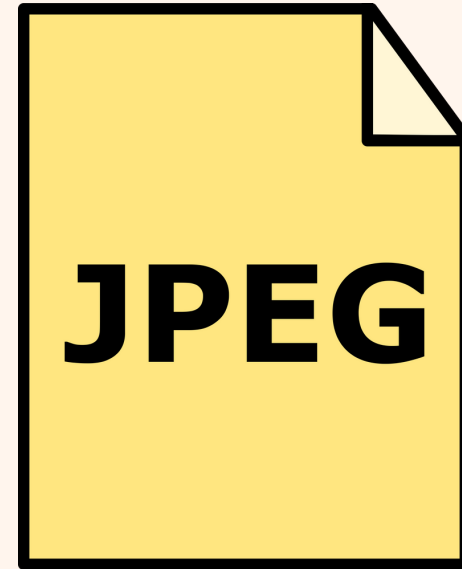
opening images saved in a broad variety of file formats
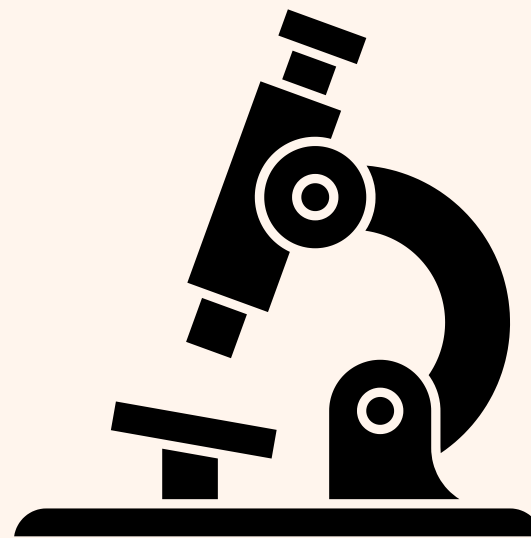
images generated by a microscope

Common image analysis techniques

O1 **Segmentation**
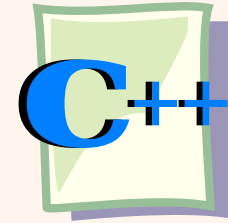
object detection/delineation

O2 **Tracking**

objects or structures of interest are separated from the background signal and tracked frame-to-frame
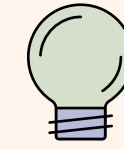
O3 **Registration**

data mining images based on morphological features and perform 3D modeling, stitching, registration, and annotation

Scripting and plugins

C++

JavaScript, Clojure, BeanShell, Groovy, Python/Jython, Ruby/ JRuby, R, and Scala

Macro Recorder

Machine learning in ImageJ

ImageJOpenCV

TensorFlow and ImageJTensorFlow

Handling big data and specialized plugins for analysis

Fiji's BigDataViewer (BDV)

CONCLUSIONS

ImageJ has grown from a simple tool to analyze two dimensional images, into a widely utilized platform for modern biological image analysis.

- Adaptable by the users, for the users
- The ImageJ wiki
- Scientific Community Image Forum
- GitHub repositories
- The challenge for the ImageJ ecosystem is to remain relevant
- The way forward will be to continue building bridges to emerging platforms for the benefit of the larger scientific community