IGTP Microscopy Platform - Image processing workstation software resources

Fiji/ImageJ https://imagej.net/

Fiji (Fiji Is Just ImageJ) is well known open-source software package for image analysis. It is **highly versatile** software supporting many different analysis pipelines through its scripting capabilities as well as large number of available plugins. Fiji installation available at the image processing workstation comes with standard set of plugins, but users are welcome to bring their own plugins to support their individual image analysis pipelines.

Resources:

Introduction to Fiji - https://www.youtube.com/watch?v=BrNtHKDbTk0 (45 min)

IGTP Microscopy Platform seminar on basic image processing tasks in Fiji - https://www.youtube.com/watch?v=GUtmJf8Nbss (60 min)

Fiji/ImageJ macro language tutorial - https://www.youtube.com/watch?v=o8tfkdcd3DA (90 min)

SVI Huygens Pro https://svi.nl/Huygens-Software

SVI Huygens Pro is a commercial software package for advanced microscopy image processing and analysis. It specializes in **deconvolution**, a technique that enhances the resolution of images by removing blur caused by the limitations of microscope systems. Moreover, it offers powerful tools for **3D image visualisation** as well as **3D object-based analysis** (size, distance, overlap etc.).

Resources:

A series of videos covering various image processing tools available in Huygens - https://www.youtube.com/watch?v=A3yGyRtMj74&list=PLAseDYNxRyZ-KI7ktcLVXhLSNWR0PxdZj&index=1

User manual: ProfessionalUserGuide24.10.pdf

QuPath https://qupath.github.io/

QuPath is an open-source software package designed for digital pathology and **whole slide image analysis**, but also highly suitable for **automated analysis of multiple images**. It is tailored to handle large, high-resolution images typically produced by tissue scanners. QuPath allows for **easy object detection, segmentation and spatial analysis**, including built-in machine learning-based approaches.

Resources:

Fluorescence image analysis tutorial - https://www.youtube.com/watch?v=WTAgXpuuqNY (35 min)
Written tutorials covering cell detection, cell classification and pixel classification of tissue slides - https://qupath.readthedocs.io/en/stable/docs/tutorials/index.html

Ilastik https://www.ilastik.org/

Ilastik is an open-source image processing software designed for **interactive machine learning-based image segmentation**, classification, and tracking. Ilastik enables users to quickly annotate data and train machine learning models for automated image processing of difficult to segment data sets. It allows for these tasks without requiring extensive programming knowledge by providing an intuitive graphical interface.

Resources:

Pixel classification-based image segmentation tutorials for:

Brightfield images - https://www.youtube.com/watch?v=QfMO9L3ZWto (10 min)

Fluorescence images - https://www.youtube.com/watch?v=MaPareZNvCw (10 min)

Pre-trained neural network-based classification of cell nuclei fluorescence images - https://www.youtube.com/watch?v=PfXCKNhsOLw (6 min)

Ilastik tutorials showcasing different image analysis workflows:

https://www.youtube.com/watch?v=N-QhiTWVDmk&list=PLeM_d8ZXiMCNXtVFvwAW23yXfTDsGFk5t

ICY https://icy.bioimageanalysis.org/

ICY is an open-source biological image analysis software that offers a flexible and modular platform with a wide range of built-in tools for image segmentation, tracking, and quantification. ICY supports advanced scripting, plugin extensions, and collaborative workflows.

Resources:

Introduction - https://www.youtube.com/watch?v=QB5_3-UYiVs (7 min)

Other installed software:

LAS X Office – Leica microscope basic image viewing, manipulation and export

Zeiss ZEN – Zeiss microscope image image viewing, manipulation and export

Anaconda – a suite of Python IDEs and tools for Python-based development and software execution