From Images to Knowledge with ImageJ & Friends

virtual conference

Nov 30 - Dec 2, 2020

Stephan Preibisch, Stephan Saalfeld, Anna Kreshuk, Pavel Tomancak and Virginie Uhlmann

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Conferences

Bioimage analysis fundamentals in Python with scikit-image, napari, & friends

Tutors: Juan Nunez-Iglesias (juan.nunez-iglesias@monash.edu)
            Nicholas Sofroniew (nsofroniew@chanzuckerberg.com)

Session 1:   2020-11-30 17:30 UTC – 2020-11-30 22:00 UTC
Session 2:   2020-12-01 07:30 UTC – 2020-12-01 12:00 UTC

Information about the tutors

Juan Nunez-Iglesias is a Senior Research Fellow at Monash Micro Imaging, Monash University, Australia. His work on image segmentation in connectomics led him to contribute to the scikit-image library, of which he is now a core maintainer. He has since co-authored the book Elegant SciPy and co-created napari, an n-dimensional image viewer in Python. He has taught image analysis and scientific Python at conferences, university courses, summer schools, and at private companies.

Nicholas Sofroniew leads the Imaging Tech Team at the Chan Zuckerberg Initiative. There he's focused on building tools that provide easy access to reproducible, quantitative bioimage analysis for the research community. He has a background in mathematics and systems neuroscience research, with a focus on microscopy and image analysis, and co-created napari, an n-dimensional image viewer in Python.

Title and abstract of the tutorial.

Title: **Bioimage analysis fundamentals in Python**

Abstract

The use of Python in science has exploded in the past decade, driven by excellent scientific computing libraries such as NumPy, SciPy, and pandas. In this tutorial, we will explore some of the most critical Python libraries for scientific computing on images, by walking through fundamental bioimage analysis applications of linear filtering (aka convolutions), segmentation, and object measurement, leveraging the napari viewer for interactive visualisation and processing. We will also demonstrate how to extend these concepts to bigger-than-RAM images using Dask.

A rough outline how the tutorial will be organized including technical requirements.

The tutorial will consist of mixed lectures and exercises. The material will cover the following topics:
- image filtering (scipy.ndimage.convolve)
- visualization in napari (napari.Viewer)
- image segmentation (skimage.segmentation.watershed, cellpose)
- object properties (skimage.measure.regionprops)
- large images (dask.array)

Students will work in pairs or small breakout groups. Some familiarity with conda environments and NumPy arrays is assumed.