

PHYS-647

Image data science with Python and Napari

Andò Edward, Invited lecturers (see below), Manley Suliana

Cursus	Sem.	Type
Physics		Opt.

Contact language	English
Credits	2
Session	
Exam	Oral presentation
Workload	60h
Hours	32
Lecture	16
Exercises	16
Number of positions	30

Frequency

Only this year

Summary

This course introduces students to the basics of image data science using Napari and Python. Students will learn image filtering, segmentation and feature extraction. Other topics include supervised and unsupervised machine learning techniques for object classification and clustering.

Content

The goal of this course is to introduce students to the basics of image data science using Napari and Python. The students will learn how to setup Conda environments, install Python libraries and setup Jupyter notebooks for scientific image and data analysis. We will start with a crash-course in Python basics. Afterwards, core concepts of image analysis such as image filtering, segmentation and feature extraction will be taught with the interactive image analysis software Napari. The students will then learn how to reproduce interactively assembled image analysis workflows using Python and Jupyter lab. Finally, we will introduce the students to supervised and unsupervised machine learning techniques for object classification and clustering. Using these techniques the students will be enabled to differentiate objects such as cells with different phenotypes using object-based measurements and state-of-the-art data science methods.

Note

Lecturers: Robert Haase and Till Korten (Technische Universität Dresden)
Host: S. Manley

Keywords

Python, Napari, bio-image analysis

Learning Prerequisites**Required courses**

Minimal python skills

Learning Outcomes

By the end of the course, the student must be able to:

- to analyze microscopy images, e.g. segmenting nuclei in one image channel and measuring intensity in another channel
- Apply this to a folder of images

- Do basic statistics, compare conditions

Resources

Websites

- <https://github.com/BiAPoL/Image-data-science-with-Python-and-Napari-EPFL2022>