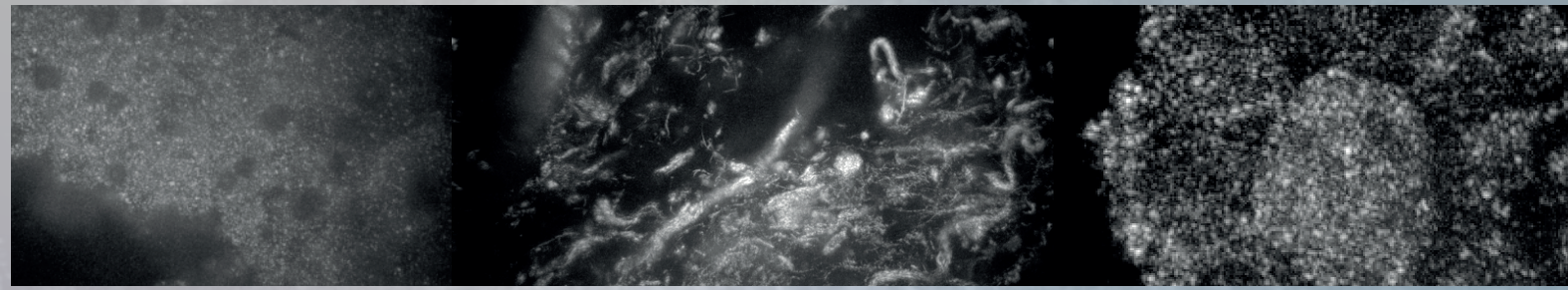
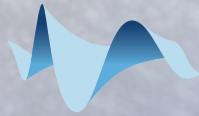


Development of computer vision algorithms for in-vivo microscopy imaging

Starting date and duration : from february 2023 for 5 months and +



Lab: Institut Langevin (Paris 5ème)
CNRS, ESPCI, PSL University
Gratification: 600€/month



Institut Langevin
ONDES ET IMAGES

Supervisors: N. Guigui, A. Aubry
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Overview

Thanks to the advent of tunable lasers and high-speed cameras, 3D imaging of biological tissues at the microscopic scale is now at reach.

At Institut Langevin (Paris), we develop efficient algorithms based on a matrix formalism to numerically compensate for aberrations and multiple scattering [1], the two fundamental limits for deep optical imaging in biological tissues

This digital microscope leads an entirely new non-invasive microscopic imaging modality. Working closely with biologists, the goal is now to extract quantitative informations from dynamic 3D images of tissues at subcellular resolution such as a tomography of its refractive index or of its scattering mean free path.

[1] A. Badon et al., *Science Advances* 6, eaay7170, 2020

Internship aim

As a member of the image analysis research team, you will be in charge of implementing Machine Learning algorithms for the extraction and analysis of quantitative information from 3D images.

This will involve (but is not restricted to) the following tasks:

- Choose and implement segmentation and detection algorithms to segment, count and classify cells by type or by disease status.
- Extend those techniques to track cells in time on dynamic data.
- Extract a wide range of deep “radiomic” features [2] and determine meaningful similarity metrics to compare tissues.
- Participate in the image acquisition process to obtain good-practice training and testing data for the above tasks.

[2] doi: 10.1186/s40644-020-00311-4

Skills

- Master’s degree in Physics, Applied Mathematics or Computer Science
- Proficiency in Python or Matlab
- Ideally, strong skills in optimization, machine learning
- Experience in Pytorch or Tensorflow is a plus
- Experience in C++ is a plus

Benefits

- Located in the heart of the Latin Quarter
- Young team (Interns/PhD students/Post-Doc)
- Possibility to modify the internship's scope according to the candidate's skills
- Gap year accepted
- Possibility of a PhD after the internship