Offer #2024-07189

CNN for calcium signal classification in astrocytes observed with 3D lattice light sheet fluorescence microscopy

Contract type : Internship agreement

Level of qualifications required : Bachelor's degree or equivalent

Fonction : Internship Research

Context

Astrocytes are glial cells in the central nervous system that recently emerged as key partners of neurons for the processing of information. Astrocytic calcium signals are involved in many key brain functions (e.g., memory and learning), and their alterations can lead to brain diseases. These signals also exhibit an important spatiotemporal diversity, and it is still unknown whether this variability relates to their role in distinct neurobiological functions. Not surprisingly, decoding this calcium code is a leading topic in neuroscience. The recent emergence of lattice light sheet microscopy (LLSM) now enables a 3D imaging with high spatiotemporal resolution of these signals. Unfortunately, the community is currently lacking of image analysis tools to detect, segment and quantify these signals in LLSM images.

Assignment

In this context, we are developing an image processing tool for neurobiologists which 1) detects and segments calcium signals in 3D+time LLSM images, and 2) classifies these signals based on their 3D space-time morphological characterization. To do so, we focus on unsupervised 3D convolutional network and machine learning techniques.

Main activities

Main goals:

- Development of an unsupervised CNN to classify different types of calcium signals
- Development of a napari plugin to annotate 3D+time data

Skills

Technical skills and level required : image processing and analysis, deep learning (CNNs), Python, and Keras, Tensorflow or Pytorch.

General Information

- **Theme/Domain** : Computational Biology
  Biologie et santé, Sciences de la vie et de la terre (BAP A)
- **Town/city** : Rennes
- **Inria Center** : [Centre Inria de l'Université de Rennes](#)
- **Starting date** : 2024-03-01
- **Duration of contract** : 6 months
- **Deadline to apply** : 2024-04-30

Contacts

- **Inria Team** : [SAIRPICO](#)
- **Recruiter** :
  Badoual Anais / anais.badoual@inria.fr

About Inria

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Instruction to apply

Defence Security :
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Recruitment Policy :
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