Inria, the French national research institute for the digital sciences, promotes scientific excellence and technology transfer to maximise its impact. It employs 2,400 people. Its 200 agile project teams, generally with academic partners, involve more than 3,000 scientists in meeting the challenges of computer science and mathematics, often at the interface of other disciplines.

Inria works with many companies and has assisted in the creation of over 160 startups. It strives to meet the challenges of the digital transformation of science, society and the economy.

Contexte et atouts du poste

CONTEXT

Astrocytes, the main type of non-neuronal cells in the brain, are critical regulators of brain development and physiology through dynamic and often bidirectional interactions with neuronal synapses. It is established that synapses are physical sites of intercellular contact that transmit and transform information in a very rapid and flexible way, playing a pivotal role for learning and memory formation as well as neurological diseases of the mammalian brain. Astrocytes are thought to integrate neuronal inputs and modulate information transfer between neurons. In particular, cytoplasmic calcium signaling in astrocytes is believed to be crucial for astrocyte-neuron communication. However, quantification of intracellular calcium signals in astrocytes is hindered by the complexity of their cell shape, that consists of a cell body sprouting a highly ramified set of large to very fine protrusions called processes. Until recently, the quantification of intracellular propagation of calcium signal in astrocytes with fluorescent calcium indicators has been restricted to two dimensions, either 2D cell cultures or 2D slicing of a 3D setup, but it is not clear what amount of information is lost by ignoring the 3rd dimension in these experiments. The emergent 3D Lattice Light Sheet Microscopy (LLS-M) is a powerful and promising technology (Voxel size: 250nm x 250nm x 700nm; Acquisition time of a 3D stack with 200 planes: 1 second) to give a much more complete and refined view of the dynamic behavior of calcium signaling in astrocytes inside living brain slices and in the intact mouse brain in vivo. Unfortunately, we lack image analysis tools to locate, segment, track and quantify the propagation of those 3D calcium signals in very ramified cell shapes.

Inria has an internationally acknowledged track record in biomedical imaging research, and provides state-of-the-art image analysis tools to its researchers. The research performs research on quantitative analysis of microscopy image data, bioimage processing, deep learning, …

Mission confiée

POST-DOCTORAL POSITION

Candidate will consolidate Serpico expertise in the research area of image analysis for biomolecule and biological signal detection, segmentation and classification. The research theme is related to the development of a highly efficient biological application in collaboration with neurobiologists. The focus will be on the development of 3D convolutional network and machine learning techniques and the creation of a software tool inspecting 3D times-series depicting neuron activities for the detection and classification of calcium signals based on their 3D space-time morphological characterization. This implies the development of innovative methods and algorithms for detection and classification of neuron signals based on machine learning methods and in particular exploiting deep learning state-of-the-art models. A special focus will be given to methods which do not use annotated data by experts.

Principales activités

MAIN ACTIVITIES

The project will be based on available experimental LLS-M data produced by Valentin Naegel’s laboratory (Interdisciplinary Institute for Neuroscience (IINS) in Bordeaux). Ongoing collaboration with Hughes Berry (Beagle Project-Team, Inria Lyon) will permit interactions between image analyses and mathematical modelling of calcium signal propagation in astrocytes. The postdoctoral fellow will have access to the computational infrastructure of Inria Rennes Research Center, consisting of powerful computing grids equipped with GPUs and data storage for analysis and machine learning. The work will be done in a highly interdisciplinary research project suggesting strong interactions with neurobiologists, biophysicists, microscopy researchers, mathematicians, statisticians and computer scientists. The postdoctoral fellow will play an active role in introducing next-generation technology (e.g. deep learning) for biological image processing and analysis in 3D live cell fluorescence imaging

Compétences

- Thèmes/Domaine : Biologie numérique
- Ville : Rennes
- Centre Inria : CRI Rennes - Bretagne Atlantique
- Date de prise de fonction souhaitée : 2019-10-01
- Durée de contrat : 1 an, 6 mois
- Date limite pour postuler : 2019-03-29

Contacts

Equipe Inria : SERPICO

Recruteur : Charles Kervrann Charles.kervrann@inria.fr

Informations générales

- SUBSCRIBED MEALS, PARTIAL REIMBURSEMENT OF PUBLIC TRANSPORT COSTS, PROFESSIONAL EQUIPMENT AVAILABLE (VIDEOCONFERENCING, LOAN OF COMPUTER EQUIPMENT, ETC.), CULTURAL AND SPORTS EVENTS AND ACTIVITIES, ACCESS TO VOCATIONAL TRAINING, SOCIAL SECURITY COVERAGE.

Consignes pour postuler

A full-time (100%) position as Postdoctoral Fellow is available at Inria Rennes for a period of 18 months.

Please send your application including:

- a Curriculum Vitae,
- a letter of application stating your motivation for the position and why you are applying,
- witnessed copies of diplomas and relevant certificates,
- a complete list of publications,
- a pdf of your most representative publications,
- a research statement also describing your previous research experience and outlining its relevance to the call topics,
- one or two recommendation letters or name of referees.

This call will remain open and applications will be reviewed until the position is filled, but for full consideration please apply by March 29th.

For further information please contact Dr. Charles Kervrann, e-mail: Charles.kervrann@inria.fr, phone: +33 2 99 84 22 21.

Sécurité défense : Ce poste est susceptible d’être affecté dans une zone à régime restrictif (ZRR), telle que définie dans le décret n°2011-1425 relatif à la protection du potentiel scientifique et technique de la nation (PPST). L’autorisation d’accès à une zone est délivrée par le chef d’établissement, après avis ministériel.
QUALIFICATIONS AND QUALITIES

We seek highly motivated individuals with experience in 3D biomedical imaging. The ideal candidates for this position have a PhD-degree within the field of biomedical image and signal processing on topics related to statistics, machine learning, inverse problems, convolutional neural networks, computational bioimaging or similar; or have submitted their doctoral dissertation for evaluation within the closing date of the application. Experience with image segmentation in biomedical imaging and/or convolution neural networks is appreciated. No background in cell biology is required, however, the candidate will be expected to become knowledgeable in the field of calcium signals in neurons, in order to interact with neurobiologists.

Strong programming skill are highly required, preferably with good knowledge of Matlab, Python and C/C++ languages. Evidence of high quality research on the above specified areas in the form of published papers in top conferences/journals and/or patents will be duly considered.

The candidate should be able to work independently and interactively in a team setting, be motivated and responsible, and also have a great work capacity and enthusiasm for research, including writing manuscripts.

The candidate should be proficient in spoken and written English.

**Avantages**

- Subsidized meals,
- partial reimbursement of public transport costs,
- professional equipment available (videoconferencing, loan of computer equipment, etc.),
- cultural and sports events and activities,
- Access to vocational training,
- social security coverage.

**Rémunération**

Monthly gross salary amounting to 2653 euros