Offer #2026-10564

Master Internship in AI for biological microscopy

Contract type : Fixed-term contract

Renewable contract : Yes

Level of qualifications required : Graduate degree or equivalent

Fonction : Internship Research

Level of experience : Recently graduated

About the research centre or Inria department

Created in 2008, the Inria Saclay Center is located at the heart of the Paris-Saclay scientific and technological excellence cluster, which alone accounts for 15% of French research. Serving the development of the Université Paris-Saclay and the Institut Polytechnique de Paris, the Inria Saclay center employs 80 people in research support services and 500 scientists of 54 nationalities.

Benefiting from continuous growth, the center now has a total of 42 project-teams and two in the process of being created, including 21 jointly with the Institut Polytechnique de Paris, 16 with the Université Paris-Saclay, as well as 7 Inria EPs, including one in collaboration with Onera and one with the Pôle Universitaire Centre Val de Loire. These research teams are spread over more than ten sites.

Context

The successful candidate will join the OPIS project team under the supervision of team leader Emilie Chouzenoux.

The project will be carried out in collaboration with E. Chouzenoux and J.-C. Pesquet (OPIS), C. Lefort (XLIM, CNRS, Limoges), and Limoges University Hospital.

The internship will last 5 to 6 months, with considerable flexibility regarding the start date. It is primarily intended for students completing their final-year engineering internship or the second year of a Master's degree (M2), but applications from engineering students taking a gap year are also welcome.

Assignment

CARS (Coherent Anti-Stokes Raman Scattering) microscopy is an advanced nonlinear optical imaging technique that provides label-free vibrational information about biomedical samples. Broadband laser sources known as “supercontinuum” sources enable the exploration of a wide range of vibrational transitions within the sample. Combined with spectral detection, multiplex CARS (M-CARS) yields hyperspectral images (HM-CARS), in which each pixel contains a 1,024-point spectrum reflecting the chemical composition of the sample.

Using this approach, the project partners https://www.multi-opto-diag.fr/khi-malma-piq/ recently demonstrated that the so-called “silent region” of HM-CARS spectra contains information that can help discriminate between samples. The biomedical potential of this information remains largely unexplored. Current data analysis methods are laborious and face several practical and methodological challenges.

The main objective of this internship is to develop fast, reliable, and automated methods for extracting information relevant to the characterization of muscle diseases from HM-CARS images. The work will combine AI-based approaches with optimization-based methods, notably by formulating spectral unmixing as an inverse problem and developing advanced proximal optimization algorithms to solve it.

Main activities

- Understand the principles of HM-CARS imaging and the challenges of data processing for muscle disease characterization.
- Explore the dataset and implement suitable preprocessing methods.
- Formulate spectral unmixing as an inverse problem and develop solution methods based on proximal optimization.
- Develop supervised learning approaches to exploit the spectral and spatial information in the images.
- Evaluate and compare the proposed methods in terms of accuracy, robustness, and computational time.
- Write scientific reports and present the results.
- Participate in scientific meetings with the project partners.

Skills

- Proficiency in the Python programming language and the PyTorch or TensorFlow environment is required.
- Experience in machine learning / neural networks is strongly recommended.
- Candidates must have validated a course in mathematical optimization.

Benefits package

- Subsidized meals
- Partial reimbursement of public transport costs
- Leave: 7 weeks of annual leave + 10 extra days off due to RTT (statutory reduction in working hours) + possibility of exceptional leave (sick children, moving home, etc.)
- Possibility of teleworking and flexible organization of working hours
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities
- Access to vocational training

Remuneration

Gratification

General Information

- **Theme/Domain :** Optimization, machine learning and statistical methods Statistics (Big data) (BAP E)
- **Town/city :** Gif sur Yvette
- **Inria Center :** Centre Inria de Saclay
- **Starting date :** 2027-03-01
- **Duration of contract :** 6 months
- **Deadline to apply :** 2027-02-28

Contacts

- **Inria Team :** OPIS
- **Recruiter :**
  Chouzenoux Emilie / emilie.chouzenoux@inria.fr

About Inria

Inria, the French national institute for research in digital science and technology, supports the French government in national research and innovation strategies in the digital field, acting as Digital Programs Agency. Inria leads over 300 research and innovation projects with its 3,500 scientists, engineers, and support staff, in partnership with universities and the digital ecosystem (businesses, entrepreneurs, and public stakeholders). Together, we explore strategic fields such as artificial intelligence, cybersecurity, quantum computing, cloud technologies, digital transformation in healthcare, digital twins, and digital technologies for defence. We develop practical solutions such as software, tech startups, partnerships with national companies, and cutting-edge training programmes. Our goal is to drive scientific, technological, and industrial excellence to ensure France’s digital sovereignty.

The keys to success

We are looking for a motivated and talented student following an engineering degree or a Master's 2 specializing in data science / artificial intelligence / image processing / computer vision.

Warning : you must enter your e-mail address in order to save your application to Inria. Applications must be submitted online on the Inria website. Processing of applications sent from other channels is not guaranteed.

Instruction to apply

Defence Security :
This position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST).Authorisation to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

Recruitment Policy :
As part of its diversity policy, all Inria positions are accessible to people with disabilities.