Offer #2025-08856

Post-Doctoral Research Visit F/M Generative AI for Cross-Field Translation of Brain FLAIR MRI: Enhancing Diagnostic Quality from Standard to Ultra-High Field Strengths

Contract type : Fixed-term contract

Level of qualifications required : PhD or equivalent

Fonction : Post-Doctoral Research Visit

Level of experience : Up to 3 years

About the research centre or Inria department

The Inria Saclay Research Centre was established in 2008. It has developed as part of the Saclay site in partnership with Paris-Saclay University and with the Institut Polytechnique de Paris since 2021.

The centre has 39 project teams , 27 of which operate jointly with Paris-Saclay University and the Institut Polytechnique de Paris. Its activities occupy over 600 scientists and research and innovation support staff, including 54 different nationalities.

Context

As part of a **public collaboration** with the Institute of Radiology of the University of São Paulo School of Medicine, **the goal is to develop a software based on**

generative AI to generate 7 Tesla (T) magnetic resonance imaging (MRI) images from corresponding images acquired at standard clinical magnetic field strengths (e.g., 1.5 T or 3 T), to improve spatial resolution of MR images, their quality (contrast and signal-to-noise ratio), and ultimately their diagnostic capability.

Several stays in São Paulo will be planned for this position to collaborate with the partner team (Dr. Fabiola Macruz) at the Radiology Institute from the Clinics Hospital of the University of São Paulo Medical School. Travel expenses will be covered within the applicable scale.

Assignment

Assignments: With the help of Philippe Ciuciu and Chaithya Giliyar-Radhakrishna within MIND, the recruited person will be tasked with consolidating a database of brain MRI exams (FLAIR or fluid attenuated inversion recovery images) acquired from healthy subjects at 3T and 7T to serve as training and conditioning for generative AI models (Generative Adversarial Network or GAN, diffusion model) that need to be trained, tested, and validated first on healthy subjects before considering possible translation to clinical settings.

For a better understanding of the proposed research topic: A description of the research topic, a state of the art, and a bibliography are available at the following URL. Feel free to visit it: https://team.inria.fr/mind/job-offers.

Collaboration: The recruited person will also collaborate with Dr. Fabiola Macruz, a neuroradiologist and researcher at Institute of Radiology (INRAD) from the Clinics Hospitals of University of São Paulo Medical School (São Paulo, Brazil), who will bring her dual expertise in AI for MRI and neuroradiological diagnosis to validate and apply the developed neural networks to a targeted pathology (e.g., multiple sclerosis or epilepsy) and clinically validate them.

Responsibilities: The person recruited under the supervision of Philippe Ciuciu will take initiatives to preprocess and organize data (open, i.e. IDEAS, OpenNeuro and EPISURG, and private databases from OpenNeuro and NeuroSpin of MRI images acquired at different magnetic field strengths, e.g., 3T and 7T or 1.5T and 3T) necessary for training generative AI models, design the best architectures in terms of generative AI (GAN, diffusion or energy-based models), train these models, validate them, and compare them according to quantitative and qualitative criteria on images of healthy subjects. Based on this benchmarking, the most promising models will then be tested on clinical applications chosen in close collaboration with our Brazilian partner team.

Steering/Management: The recruited person will be responsible for developing software to synthesize very high magnetic field (e.g., 7T) FLAIR MRI images from images collected at lower fields using PyTorch, creating a standalone Python package deployable in various environments, including clinical settings, writing the tests and documentation, and ensuring its dissemination.

Main activities

Main Activities:

- Analyze available databases of paired brain MRIs acquired at 1.5 or 3T and 7T;
- Develop generative AI to synthesize 7T FLAIR MRIs from 1.5 or 3T images;
- Test and validate these models on healthy subjects;
- Collaborate with our Brazilian clinical partner to evaluate targeted pathologies.

Additional Activities:

- Write software documentation;
- Present the progress of the work at international conferences in AI, MRI, and radiology;
- Write associated publications and disseminate the results to academic and clinical communities.

Skills

Technical Skills and Required Level: Ph.D. in biomedical imaging, machine learning, or neuroimaging. Excellence in deep learning, generative AI (GAN, VAE, etc.), and scientific programming with a complete mastery of Python and the PyTorch environment.

Languages: Excellent written and oral communication skills in English. Proficiency in French and/or Portuguese is a plus, but not mandatory.

Interpersonal Skills: Good listening, communication, and adaptability skills are necessary, as this interdisciplinary research project involves collaborators in AI, MRI, and neuroradiology.

Additional skills appreciated include understanding basic MRI concepts and strong signal processing knowledge.

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

Remuneration

2788 € gross/month

General Information

- **Theme/Domain :** Computational Neuroscience and Medicine
  Scientific computing (BAP E)
- **Town/city :** Palaiseau
- **Inria Center :** Centre Inria de Saclay
- **Starting date :** 2025-11-01
- **Duration of contract :** 2 years
- **Deadline to apply :** 2025-10-31

Contacts

- **Inria Team :** MIND
- **Recruiter :**
  Ciuciu Philippe / Philippe.Ciuciu@inria.fr

About Inria

Inria is the French national research institute dedicated to digital science and technology. It employs 2,600 people. Its 200 agile project teams, generally run jointly with academic partners, include more than 3,500 scientists and engineers working to meet the challenges of digital technology, often at the interface with other disciplines. The Institute also employs numerous talents in over forty different professions. 900 research support staff contribute to the preparation and development of scientific and entrepreneurial projects that have a worldwide impact.

The keys to success

We are seeking highly motivated candidates passionate about engaging research topics in AI, neuroimaging, clinical applications, and magnetic resonance imaging (MRI).

The expected collaborator will have the following profile:

- An interest and affinity for interdisciplinary research between artificial intelligence (AI), particularly deep learning, and brain imaging, notably MRI;
- Demonstrated excellence in generative AI, rigorous reasoning, a strong critical mindset, and significant autonomy;
- The ability to work in an international, multicultural environment and to collaborate as part of a team, especially within a global partnership;
- A proactive and innovative approach.

Expected skills:

- Comfortable in a dynamic and interdisciplinary scientific environment with a strong foundation in applied mathematics, where a love for learning and listening are essential qualities for success in this role.
- Passionate about innovation and working at the interface between methodology and clinical application, with expertise in generative AI, Python programming (particularly in PyTorch), and a solid understanding of neuroimaging. A PhD in biomedical imaging or AI for brain MRI would be a significant asset.

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.