Offre n°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

Type de contrat : Fixed-term contract

Niveau de diplôme exigé : PhD or equivalent

Fonction : Post-Doctoral Research Visit

Niveau d'expérience souhaité : Up to 3 years

A propos du centre ou de la direction fonctionnelle

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.

Contexte et atouts du poste

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.

Mission confiée

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.

Principales activités

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.

Compétences

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.

Avantages

- 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

Rémunération

2788 € gross/month

Informations générales

- **Thème/Domaine :** Computational Neuroscience and Medicine
  Scientific computing (BAP E)
- **Ville :** Palaiseau
- **Centre Inria :** Centre Inria de Saclay
- **Date de prise de fonction souhaitée :** 2025-11-01
- **Durée de contrat :** 2 years
- **Date limite pour postuler :** 2025-10-31

Contacts

- **Équipe Inria :** MIND
- **Recruteur :**
  Ciuciu Philippe / Philippe.Ciuciu@inria.fr

A propos d'Inria

Inria est l'institut national de recherche dédié aux sciences et technologies du numérique. Il emploie 2600 personnes. Ses 215 équipes-projets agiles, en général communes avec des partenaires académiques, impliquent plus de 3900 scientifiques pour relever les défis du numérique, souvent à l'interface d'autres disciplines. L'institut fait appel à de nombreux talents dans plus d'une quarantaine de métiers différents. 900 personnels d'appui à la recherche et à l'innovation contribuent à faire émerger et grandir des projets scientifiques ou entrepreneuriaux qui impactent le monde. Inria travaille avec de nombreuses entreprises et a accompagné la création de plus de 200 start-up. L'institut s'e?orce ainsi de répondre aux enjeux de la transformation numérique de la science, de la société et de l'économie.

L'essentiel pour réussir

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.

Consignes pour postuler

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 favorable, tel que défini dans l'arrêté du 03 juillet 2012, relatif à la PPST. Un avis ministériel défavorable pour un poste affecté dans une ZRR aurait pour conséquence l'annulation du recrutement.

Politique de recrutement :
Dans le cadre de sa politique diversité, tous les postes Inria sont accessibles aux personnes en situation de handicap.