Offre n°2025-09186

PhD Position F/M Assessment and reduction of re-identification risk from internal brain tissues of brain MRIs

Type de contrat : Fixed-term contract

Contrat renouvelable : Oui

Niveau de diplôme exigé : Graduate degree or equivalent

Fonction : PhD Position

A propos du centre ou de la direction fonctionnelle

The Centre Inria de l'Université de Grenoble groups together almost 600 people in 24 research teams and 9 research support departments.

Staff is present on three campuses in Grenoble, in close collaboration with other research and higher education institutions (Université Grenoble Alpes, CNRS, CEA, INRAE, …), but also with key economic players in the area.

The Centre Inria de l'Université Grenoble Alpes is active in the fields of high-performance computing, verification and embedded systems, modeling of the environment at multiple levels, and data science and artificial intelligence. The center is a top-level scientific institute with an extensive network of international collaborations in Europe and the rest of the world.

Contexte et atouts du poste

Context. This PhD thesis is part of the MIAI Chair project RAIDAC+ (Responsible AI: Design, Regulation and Conformity).

The thesis will be conducted under a co-tutelle agreement between Inria (France) and ÉTS Montreal (Canada), leveraging the complementary strengths of both institutions.

The envisioned plan is for the recruited PhD student to spend approximately three years at Inria (Privatics team), followed by 1 year at ÉTS Montreal. This structure will provide a rich and balanced international training environment, enabling the student to benefit from diverse expertise, ecosystems, and research cultures.

The thesis will be co-supervised by:

- Antoine Boutet, Associate professor at Insa-Lyon
- Mohamed Maouche, Research at Inria
- Héber H. Arcolezi, Researcher at Inria and in-coming Assistant Professor at ÉTS Montreal (February 2026).
- Ulrich Aïvodji, Assistant Professor at ÉTS Montreal.

The PhD project will focus on the development of responsible AI methods for the protection of sensitive medical imaging data. In particular, the research will address challenges related to privacy in the processing of complex neuroimaging data (e.g., MRI), with an emphasis on anonymization techniques and regulatory alignment. The student will benefit from interdisciplinary supervision and expertise spanning privacy engineering, ethical AI, and clinical data modeling, as well as from international mobility and collaboration opportunities enabled by the co-tutelle, reinforcing the global and applied dimension of their doctoral training.

Mission confiée

The increasing digitization of healthcare and the deployment of machine learning (ML) models in clinical settings raise urgent concerns around the protection of medical imaging data. Traditional anonymization techniques, such as defacing (removing facial features from MRI scans), have proven insufficient to prevent re-identification, especially as deep learning advances enable new biometric risks from internal brain structures.

This PhD project seeks to go beyond conventional defacing by investigating responsible AI techniques for privacy-preserving medical imaging. The central goal is to ensure that MRI data can be safely shared and used for machine learning while preserving both clinical relevance and patient privacy.

Research Objective: The thesis will aim to develop and evaluate advanced anonymization techniques tailored for neuroimaging data that are effective against re-identification risks yet compatible with diagnostic pipelines. Specifically, the project will focus on:

- Risk analysis: Characterizing re-identification threats arising from internal brain anatomy (beyond facial features), using deep embedding techniques inspired by facial recognition (e.g., DeepFace) and voice anonymization (e.g., VoicePrivacy).

- Region sensitivity mapping: Identifying brain areas most susceptible to re-identification, to support informed decision-making with clinicians about which regions may be altered without compromising clinical analysis.

- Privacy-preserving transformations: Developing both ad hoc and learning-based anonymization methods (e.g., regional blurring, morphological normalization, privacy-preserving autoencoders and GANs) to mitigate identity leakage while preserving diagnostic quality.

- Clinical validation: Testing the proposed methods on real-world clinical datasets in collaboration with medical practitioners, to ensure clinical relevance and integration with existing tools (e.g., automatic diagnosis,

longitudinal tracking).

- Impact on ML performance: Evaluating how these privacy transformations affect downstream ML tasks, including the training of deep learning models for disease detection on anonymized data.

The outcomes of this PhD are expected to contribute to the broader field of responsible AI in healthcare, offering practical techniques and theoretical insights for privacy-preserving, fair, and clinically aligned machine learning on medical imaging data.

Principales activités

Main activities:

- Conduct original research on privacy-preserving and ethically aligned machine learning techniques for medical imaging, with a focus on MRI data anonymization and diagnostic integrity.
- Collaborate closely with interdisciplinary team members and project partners, including Inria, INSA Lyon, ÉTS Montréal, and clinical collaborators.
- Disseminate research findings through peer-reviewed publications and presentations at leading international conferences in AI, medical imaging, and data privacy.

Compétences

We are looking for a candidate with:

- Good programming skills in Python and good analytical skills.
- A good background in probability/statistics and deep learning is expected.
- Knowledge on medical imaging is a plus, but not necessary.
- The candidate should be fluent in English.

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
- Access to vocational training
- Social security coverage

Rémunération

2200 euros gross salary /month

Informations générales

- **Thème/Domaine :** Security and Confidentiality
  Statistics (Big data) (BAP E)
- **Ville :** Villeurbanne
- **Centre Inria :** Centre Inria de Lyon
- **Date de prise de fonction souhaitée :** 2025-10-01
- **Durée de contrat :** 3 years
- **Date limite pour postuler :** 2025-09-15

Contacts

- **Équipe Inria :** PRIVATICS
- **Directeur de thèse :**
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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.

Attention: Les candidatures doivent être déposées en ligne sur le site Inria. Le traitement des candidatures adressées par d'autres canaux n'est pas garanti.

Consignes pour postuler

Applications must be submitted online via the Inria website. Processing of applications submitted via other channels is not guaranteed.

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.