Offre n°2025-08986

Post-Doctoral Research Visit F/M Event-based unsupervised waveform learning for physiological signals

Le descriptif de l'offre ci-dessous est en Anglais

Type de contrat : CDD

Niveau de diplôme exigé : Thèse ou équivalent

Fonction : Post-Doctorant

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

The postdoc will take place in Inria Saclay, in the MIND team. This is a large team working focused on mathematical methods for statistical modeling of brain function using neuroimaging data (fMRI, MEG, EEG). Particular topics of interest include machine learning techniques, numerical and parallel optimization, applications to human cognitive neuroscience, event detection, and scientific software development. A particular emphasis is put on interdisciplinary projects.

Mission confiée

A natural way to describe physiological signals that is compatible with events is to consider recurring patterns, whose localization can be seen as a train of events. These descriptions are already used by both learning-based methods and in more manual pipelines. For instance, in neuroscience, the interest in transient waveforms to describe in M/EEG recordings has risen in recent years as markers of cognitive functions or pathologies. The success of these representations mostly depends on the way to select the patterns. However, most methods consider that the occurrences of physiological events are independent and cannot incorporate knowledge from external events. This leads to unreliable event extraction, where spurious and non-plausible events are detected. Moreover, this makes it harder to highlight global properties in the signal, such as the rhythms or the link between different events. The goal of this postdoc will be to develop efficient end-to-end procedures to detect and model events in physiological signals, accounting for their inter-dependence patterns. In particular, we will aim to extend Convolutional Dictionary Learning (CDL) to the case where its activations follow PP models, which describe both the activations and external events. The major challenge will be to propose efficient and reliable solvers to solve the resulting optimization problem. Due to the scale of the problem (commonly over 100,000 time points), this step will require large-scale and distributed optimization, which will benefit from previous work on distributed solvers for CDL in the team.

Principales activités

main activities :

- Read papers and state of the art
- Benchmark existing algorithms
- Adapt the formulation to the target scenario.
- Program, run, and analyze simulation results.

Complementary activities

- Participate in the team's activities: scientific meetings, seminars, and scientific presentations.

Compétences

- Strong mathematical background. Knowledge in machine learning is a plus.
- Good programming skills in Python. Knowledge of a deep learning framework is a plus.

- The candidate should be proficient in English. Knowing French is not necessary, as daily communication in the team is mostly in English due to the strong international environment.

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 :** Neurosciences et médecine numériques
  Statistiques (Big data) (BAP E)
- **Ville :** Palaiseau
- **Centre Inria :** Centre Inria de Saclay
- **Date de prise de fonction souhaitée :** 2025-11-01
- **Durée de contrat :** 2 ans
- **Date limite pour postuler :** 2025-09-30

Contacts

- **Équipe Inria :** MIND
- **Recruteur :**
  Moreau Thomas / thomas.moreau@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 seek candidates strongly motivated by challenging research topics in machine learning for science. Applicants should have a strong mathematical background with knowledge of numerical optimization and machine learning. With regards to software engineering, proficiency in Python is expected, and experience in applying ML to large-scale data is a plus.

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

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.