Offer #2025-09045

Doctorant F/H Impact of treatment administration on the progression of neurodegenerative diseases

The offer description below is in French

Contract type : Fixed-term contract

Level of qualifications required : Graduate degree or equivalent

Fonction : PhD Position

Context

Treatment effects on disease progression are key elements to support therapeutic decisions. Methods exist to model the natural progression of the disease. Among them, the Disease Course Mapping method proposed by Schiratti et al. [1] allows modeling individual trajectories on Riemannian manifolds within a Bayesian mixed–effects framework and is implemented in an open-source software library called *Leaspy*.

Modeling how a treatment influences this evolution is challenging. One option is to use an extension of the Disease Course Mapping toward a piecewise-geodesic formulation. This extension allows for capturing structural breaks in disease progression, such as those potentially induced by therapeutic interventions. A compelling methodological basis for this type of model has been proposed by Chevallier et al. [2], who applied it to study treatment effects in kidney cancer. While the model shows promise, fundamental questions about its identifiability and practical implementation remain to be addressed. This is particularly true for settings involving complex parameterizations or sparse data.

The objective of this PhD project is to investigate these issues, implement them in the *Leaspy* library if feasible or in a new library, and apply the method to real data from patients affected by neurodegenerative disease.

References:

[1] Schiratti, Jean-Baptiste, Stéphanie Allassonnière, Olivier Colliot, and Stanley Durrleman. "A Bayesian mixed-effects model to learn trajectories of changes from repeated manifold-valued observations." *Journal of Machine Learning Research*18, no. 133 (2017): 1-33.

[2] Juliette Chevallier, Stéphane Oudard, Stéphanie Allassonnière. Learning spatiotemporal piecewise geodesic trajectories from longitudinal manifold-valued data. 31st Conference on Neural Information Processing Systems (NIPS 2017), Dec 2017, Long Beach, United States. hal-01646230

Assignment

- investigate how to implement the effect of treatment on a longitudinal multivariate model,
- implement them in the *Leaspy* library if feasible or in a new library,
- apply the method to real data from patients affected by neurodegenerative disease.

Main activities

Activités principales :

- Veille scientifique et construction d'une bibliographie
- Rédaction et publication d'articles scientiques
- Implémentations d'artefacts logiciels effectuant la démonstration des résultats de recherche
- Apprentissage des compétences du métier de la recherche

Activités secondaires :

- Participation à la vie scientifique de l'équipe (séminaires, groupes de lecture)
- Participation à des conférences scientifiques

Benefits package

- Restauration subventionnée
- Transports publics remboursés partiellement
- Congés: 7 semaines de congés annuels + 10 jours de RTT (base temps plein) + possibilité d'autorisations d'absence exceptionnelle (ex : enfants malades, déménagement)
- Possibilité de télétravail et aménagement du temps de travail

- Équipements professionnels à disposition (visioconférence, prêts de matériels informatiques, etc.)
- Prestations sociales, culturelles et sportives (Association de gestion des œuvres sociales d'Inria)
- Accès à la formation professionnelle
- Sécurité sociale

General Information

- **Theme/Domain :** Computational Neuroscience and Medicine
  Biologie et santé, Sciences de la vie et de la terre (BAP A)
- **Town/city :** Paris
- **Inria Center :** Centre Inria de Paris
- **Starting date :** 2025-10-01
- **Duration of contract :** 3 years
- **Deadline to apply :** 2025-07-23

Contacts

- **Inria Team :** ARAMIS
- **PhD Supervisor :**
  Tezenas Du Montcel Sophie / sophie.tezenas-du-montcel@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.

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.