Offer #2025-09138

Research engineer - Statistical analysis of longitudinal medical data

Contract type : Fixed-term contract

Renewable contract : Yes

Level of qualifications required : PhD or equivalent

Fonction : Temporary scientific engineer

Context

You will work in the context of the project REWIND (pRecision mEdecine WIth longitudinal Data), a multicentric project (Paris, Bordeaux, Lyon, Grenoble, Nice) granted via the “Investissement d’avenir” PEPR Santé Numérique. The project will focus on the development of new mathematical and statistical approaches for the analysis of multimodal multiscale longitudinal data. These models will be designed, implemented as prototypes, and then transferred to an easily used and well-documented platform where researchers from diverse communities, particularly physicians, will be able to analyze their datasets. The project will allow the development of a new generation of decision support systems, which will help clinicians at the bedside to make more informed decisions for the patient. They will contribute to the development of precision medicine in several key areas.

In this context, you will work in two teams: HeKA (Inria-Inserm-Université Paris Cité) and ARAMIS lab (Inria, CNRS, Inserm and Sorbonne Université). HeKA is located at the PariSanté Campus (https://parisantecampus.fr), while the ARAMIS lab is located at the Paris Brain Institute (https://institutducerveau-icm.org). While HeKA aims at developing methods, models, and tools to create, evaluate, and validate learning health systems, ARAMIS lab is dedicated to the development of new computational approaches for the analysis of large neuroimaging and clinical datasets.

You will be strongly involved in the scientific aspects of the work, such as discussion of methodological issues and interpretation of results. You will interact locally with the PhD students, postdoctoral fellows, and engineers. You will take part in the communications and publications resulting from the use of the software.

Assignment

The ARAMIS lab develops the open-source software Leaspy [1,2,3] (https://leaspy.readthedocs.io/en/stable/, https://github.com/aramis-lab/leaspy), a Python library for the statistical analysis of longitudinal data, particularly medical data that comes in the form of repeated observations of patients at different time points. Leaspy allows users to easily fit various models to large-scale clinical studies consisting of clinical scores, cognitive assessments, physiological measurements, or imaging-derived data. Leaspy aims at recombining these series to reconstruct the long-term spatio-temporal trajectory of disease evolution. Each patient can then be positioned relative to the group-average timeline, in terms of both the temporal and spatial differences. Future observations, as well as virtual patient trajectories, can then be simulated. Leaspy is distributed freely to the scientific community and has users worldwide. It has been used to produce high-impact medical publications that have advanced the understanding of neurodegenerative diseases such as Alzheimer's disease, fronto-temporal dementia, and amyotrophic lateral sclerosis [4,5,6,7].

1. Schiratti, S. Allassonnière, O. Colliot, S. Durrleman: 'A Bayesian mixed-effects model to learn trajectories of changes from repeated manifold-valued observations', **The Journal of Machine Learning Research**, 18:1-33, 2017E.
2. Poulet, S. Durrleman: 'Multivariate disease progression modeling with longitudinal ordinal data', **Statistics in Medicine**, 42(18), 3164-3183, 2023
3. Fournier, S. Durrleman: 'A Multimodal Disease Progression Model for Genetic Associations with disease Progression Model for Genetic Associations with Disease Dynamics', International Conference on Medical Image Computing and Computer-Assisted Intervention', (pp. 601-610), **Springer Nature Switzerland**, 2023
4. Maheux, I. Koval, J. Ortholand, C. Birkenbihl, D. Archetti, V. Bouteloup, …, S. Durrleman: 'Forecasting individual progression trajectories in Alzheimer's disease', **Nature Communications**, 14(1), 761, 2023
5. Ortholand, P.F. Pradat, S. Tezenas du Montcel, S. Durrleman : 'Interaction of sex and onset site on the disease trajectory of amyotrophic lateral sclerosis', **Journal of Neurology**, 270(12), 5903-5912, 2023
6. Di Folco, R. Couronné, I. Arnulf, G. Mangone, S. Leu-Semenescu, P. Dodet, …, S. Durrleman : 'Charting disease trajectories from isolated REM sleep behavior disorder to Parkinson's disease', **Movement Disorders**, 39(1), 64-75, 2024
7. Moulaire, P.E. Poulet, E. Klockgether, …, S. Durrleman : 'Temporal dynamics of the scale for the assessment and rating of ataxia in spinocerebellar ataxias', **Movement Disorders**, 38(1), 35-44, 2023

Main activities

You will be in charge of the development of new features (implementation of new models, algorithms, metrics, visualizations), software maintenance, user support, and animation of the community.

In addition, you will be presenting the software at international scientific conferences and other events (organized, for instance, by Inria, ICM, CNRS…). Finally, you will contribute to ambitious medical studies by using Leaspy on large databases of patients, contributing to the interpretation of results, and providing

assistance to users (internal to the lab and external collaborators).

Skills

PhD degree or master + experience in the field of statistical analysis

Strong programming skills in Python

Experience working with Git/GitHub on open-source projects would be a plus

Excellent relational and communication skills to interact with users and lab members

Good writing skills (documentation, website, scientific articles)

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
- Access to vocational training
- Social security coverage

General Information

- **Theme/Domain :** Computational Neuroscience and Medicine
  Software engineering (BAP E)
- **Town/city :** Paris
- **Inria Center :** Centre Inria de Paris
- **Starting date :** 2025-11-01
- **Duration of contract :** 12 months
- **Deadline to apply :** 2025-08-09

Contacts

- **Inria Team :** HEKA
- **Recruiter :**
  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.