ARAMIS LAB
Paris Brain Institute (ICM)
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JOB OFFER

Research Engineer
Deep learning for brain image analysis

Keywords: Deep learning, python, neuroimaging, image analysis, reproducibility

The topic

The ARAMIS Lab (www.aramislab.fr) at the Paris Brain Institute (https://institutducerveau-icm.org/en) develops advanced deep learning tools to solve unmet needs in neuroimaging. This is done within the framework of multidisciplinary projects conducted in collaboration with medical teams at the Paris Brain Institute. All developments are performed within the Open Source software platform [Thibeau-Sutre et al., 2022] which is developed by the ARAMIS Lab. ClinicaDL is an end-to-end framework to ease development of deep learning applications for neuroimaging data and to prevent common pitfalls that we identified and described in a previous study [Wen et al., 2020]. These pitfalls are the difficult use of neuroimaging data sets by users with little expertise, data leakage during training and testing, and insufficient reproducibility. ClinicaDL includes a set of tools to prepare data for deep learning tasks (such as quality check, label definition, generation of synthetic data), architecture search, network training, as well as result inference, model evaluation and interpretation. In addition, it implements a set of technical solutions to avoid the main methodological issues causing data leakage found in the literature. ClinicaDL allows its users to work with a great diversity of neuroimaging data sets as it interacts with a neuroimaging standard, the Brain Imaging Data Structure. This structure eases data processing by Clinica [Routier et al., 2021], the companion project of ClinicaDL.

We are looking for a Research Engineer that will both contribute to the development of the ClinicaDL platform, and train and validate deep learning models that can solve unmet needs for analysis of neuroimaging data and provide new biomarkers in various brain disorders (multiple sclerosis, Parkinson's disease…) in collaboration with our medical partners.

- ClinicaDL: https://github.com/aramis-lab/clinicadl | https://clinicadl.readthedocs.io
- Clinica: https://github.com/aramis-lab/clinica | www.clinica.run
- Thibeau-Sutre, E., Diaz, M., Hassanaly, R., Routier, A., Dormont, D., Colliot, O., Burgos, N (2022). ClinicaDL: An Open-Source Deep Learning Software for Reproducible Neuroimaging Processing, Computer Methods and Programs in Biomedicine, 220, pp.106818. https://hal.archives-ouvertes.fr/hal-03351976
- Wen, J., Thibeau-Sutre, E., Diaz-Melo, M., …, D., Durrleman, S., Burgos, N., Colliot, O. (2020). Convolutional neural networks for classification of Alzheimer's disease: Overview and reproducible evaluation. *Medical Image Analysis*, 63: 101694. https://hal.science/hal-02562504
- Routier, A., Burgos, N., Díaz, M., …, Colliot, O. (2021). Clinica: An Open-Source Software Platform for Reproducible Clinical Neuroscience Studies. *Frontiers in Neuroinformatics*, 15, 689675. https://doi.org/10.3389/fninf.2021.689675

Your mission

You will be in charge of the:

- implementation of new architectures into the ClinicaDL software platform (in particular for image segmentation, image translation and image synthesis),
- training and validation of deep learning models using various neuroimaging modalities and datasets provided by our medical partners,
- interpretation of results and contribution to scientific publications,
- interaction with medical partners.

You will also be involved in the:

- software maintenance,
- user support and animation of the community,
- contribution to training and dissemination with the other engineers of the team.

In addition, you will be presenting the software at international scientific conferences and other events (organized for instance by Inria, ICM, CNRS).

A vibrant scientific, technological, clinical and ethical environment

You will work within the ARAMIS Lab (www.aramislab.fr) at the Paris Brain Institute (https://institutducerveau-icm.org/en), one of the world top research institutes for neurosciences. The institute is ideally located at the heart of the Pitié-Salpêtrière hospital, downtown Paris.

The ARAMIS Lab, which is also part of Inria (the French National Institute for Research in Digital Science and Technology), is dedicated to the development of new computational approaches for the analysis of large neuroimaging and clinical data sets. You will interact locally with the PhD students, postdoctoral fellows and engineers of the ARAMIS Lab as well as with medical teams at the ICM.

Your profile

- PhD degree or Master
- Strong programming skills in Python
- Solid knowledge of deep learning is mandatory
- Knowledge of digital image processing is mandatory and experience with medical imaging would be a strong plus
- Good understanding of the software development process and tools (Git, continuous integration, tests)
- Excellent relational and communication skills
- Good writing skills (documentation, website, scientific articles)

Salary: depending on experience
Type of contract: fixed-term contract (duration to be discussed)
Starting date: as soon as possible

Ready to take up the challenge?

Send your CV to olivier.colliot@cnrs.fr, ninon.burgos@icm-institute.org and camille.brianceau@icm-institute.org