



Developer position: Machine learning for Brain Neuroimaging

Main topic: Open-source software for neuroimaging data analysis

Keywords: Brain imaging, machine learning

Research team: ORIGAMI Lab (McGill University)

Contact: Jean-Baptiste Poline, jean-baptiste.poline@mcgill.ca

Start and duration of contract: 2022-11-01, for 2 years

Salary: Depending on experience.

Application: Send CV and motivation letter to jean-baptiste.poline@mcgill.ca and jerome.dockes@mcgill.ca

The Nilearn Python library

We are looking for a programmer to help develop and maintain Nilearn. Nilearn is one of the most widely used Python libraries for neuroimaging and focuses on applying advanced machine learning and signal processing to human brain images. If you are hired for this position, you will join our research group, the ORIGAMI lab, at McGill University. You will collaborate with Nilearn contributors at McGill University, Université de Montréal, and around the world.

Statistical analysis of brain images, and in particular of functional Magnetic Resonance Images (fMRI), provides many insights to basic and clinical neuroscience. In recent years, large fMRI datasets became publicly available and applying modern machine-learning techniques to fMRI data has proven fruitful. Nilearn provides reliable and user-friendly implementations of statistical methods developed by the neuroimaging research community. The project unites researchers in neuroscience, statistics and machine learning.

Nilearn is a key component of the open-source scientific software stack for neuroimaging. Several aspects of the library are in active development, such as the modules related to General Linear Models (linear model fitting and hypothesis testing to identify associations between mental tasks and neural activity). You will participate in adding important new features, maintaining the existing codebase and infrastructure, and interacting with Nilearn's dozens of active contributors and hundreds of users.

Job Offer description

Long-term development You will work on adding important new features to Nilearn. Which features are prioritized will depend on your interests and skills, but here are some of the most important development directions:

- Improved support for GLM model fitting, the classical fMRI mass-univariate analysis.
- Support for the Brain Imaging Data Structure, a standard for sharing neuroimaging datasets.
- Improved analysis and visualizations for surface data – brain activity represented as a signal on the surface of the cortex, rather than as a 3D full-brain image.
- Interactive HTML reports to inspect fitted models and output of model validation experiments.

Maintaining the codebase and infrastructure You will share the responsibility of maintaining the library's usability and code quality. This involves thorough reviews of Pull Requests created by other core developers or community contributors, addressing issues opened on the GitHub repository and fixing bugs, and maintenance of the Continuous Integration configuration.

Interacting with the community of users and contributors You will help animate the community that has built up around Nilearn and provide assistance to users and contributors. You will participate in weekly drop-by hours (Q&A for users), monthly core-developer meetings, and occasional social events such as Nilearn dev-days ([2021 edition](#)), [brainhack](#), coding sprints, and training on software development. You will answer issues in the GitHub repository and usage questions in the [NeuroStars](#) forum.

Skills and profile

We are looking for someone who :

- is a competent software programmer who loves open-source and creating high-quality, well-tested and well-documented software,
- is familiar with Python and the scientific Python stack used by Nilearn: Numpy, Scipy, Matplotlib (and ideally Scikit-learn),
- is enthusiastic about providing a good experience and support for users and communicating with them in a friendly manner,
- has interest in brain imaging and its applications.

Working at McGill University

McGill is one of the best employers in Quebec and Canada, offering a number of benefits. The University is ranked as one of the best in Canada and worldwide. Montreal is a lively, safe and multicultural city. McGill will be sponsoring the work permit if necessary. The ORIGAMI laboratory is a friendly, collaborative and technically savvy environment of about 12 students, post-doctoral fellows and developers.