Job description: BrainPedia PhD student

Function
PhD thesis on the inference of a brain model from functional neuroimaging data within the BrainPedia project

Context
BrainPedia is 4-year project that aims at building a knowledge-based analysis system for functional neuroimaging. It will be performed in the Neurospin neuroimaging centre by researchers of the Parietal project team (INRIA Saclay-Île-de-France). Based on multi-protocol brain image data, BrainPedia will be built upon various data processing tools to infer models of the spatial organization of brain activity in different experimental contexts and to compute templates of brain functional organization. BrainPedia will rely on an adequate database organization to host the data from selected protocols available at Neurospin, that will be handled through image processing and algorithmic routines organized in processing pipelines. Finally, statistical inference tools and a user interface will be built to allow users to submit queries about brain functional anatomy.

Objectives
The PhD candidate will be involved in the development of three aspects of the projects that require computer science and applied mathematics skills: i) the development of light database infrastructure, to give an adequate view on the data; this will be built and managed with the help of research engineers present at Neurospin; ii) the analysis of the data available in the database in order to infer spatial models of brain activation; this should yield automated data processing pipelines iii) the organization of a statistical toolbox that will interface existing statistical analysis procedures to build and deal with queries upon the information present in the database at various processing stages. The candidate will have the opportunity to work in a multi-disciplinary environment, and will face various actors and points of view in this project: applied mathematics/modeling/statistics, computer science and neuroimaging. The PhD candidate will take advantage of many existing tools, such as scientific python (numpy, scipy, scikits) and visualization libraries (matplotlib, mayavi), existing neuroimaging tools and softwares, in particular those developed within the Parietal team (nipy, brainvisa).

Required skills
- Good expertise on modeling and applied mathematics (statistics, image processing algorithms , model selection, machine learning).
- The candidate should be motivated by neuroimaging research.
- Programming in Python and/or object-oriented setting, basic knowledge on databasing are a plus.
- Linux environment.
- Fluent English.

About the team

Parietal is a small team of computer scientists developing algorithms for data processing and modeling of brain images. It is embedded in Neurospin, a research institute dedicated to various aspects of brain imaging and grouping cognitive neuroscientists, medical doctors, imaging physicists and computer scientists. As a member of Parietal, the PhD candidate will benefit from the rich scientific environment of Neurospin. Parietal is part of INRIA, the French national computer science institute.

Gross salary
About 2000 euros per month.

Time span of the project
2011-2014 (36 months).

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