Two Post-doctoral positions in personalized whole brain models for neuroscience: inference and validation, University of Padova, Italy.

Description

Two post-doc applications (see details below) are sought in the context the following project funded by the Department of Information Engineering, University of Padova:

Title of the project
Personalized whole brain models for neuroscience: inference and validation

Abstract:
Contemporary neuroscience has embraced network science to study the complex and self-organizedstructure of the human brain, with the promise of addressing key societal issues such as neuraldegeneration and treatment of neurological and psychiatric diseases and damages. These objectiveswill be pursued in this highly interdisciplinary project following a data-driven model based approach:our final goal is to design novel algorithmic solutions for data-driven inference of whole-brainmesoscale dynamical models as well as to develop and validate (or invalidate) models based on bothdata driven as well as methodological studies. Ideally, these models should provide solid grounds todevelop (i) novel individual-level features for predicting cognitive and behavioral deficits originatedby brain lesions or neuro-degeneration and (ii) simulation tools for designing personalized treatmentssuch as stimulation.

Team: The post-docs will work in an interdisciplinary team composed of Engineers, Psychologists, Neurologists and Physicists

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Post Doc # 1

Duration:

24 months (possibly extended to 36 month)

Activity:

The Post-Doc will develop and refine algorithms for estimation of effective connectivity models from neuroimaging data (fMRI) providing also an in-depth comparison between different classes of methodologies (e.g. DCM-like models and “Granger’’ causality type models). He/she will also actively collaborate in the validation studies and work in close interaction with the external collaborators (neurologists, neuroscientists, physicists).

Profile:

The ideal candidate should have a recent PhD in engineering, applied mathematics/physics, statistics,computer science, and related fields. He/she must have demonstrated experience in complex systemmodeling and advanced analytic techniques (e.g. multivariate approaches, machine learning, graphtheory etc.). Strong analytical/mathematical skills are a requirement. Experience in one or more areasof neuroimaging will be plus. Programming skills (C, C++, Python, Matlab) are not a prerequisite,but a clear advantage. Moreover, the candidate must be highly motivated and creative individual withthe ability to work in a dynamic, multi-disciplinary research environment and be willing to interactwith both experimental and theoretical neuroscientists.

Salary:

25k to 30k Euro per year depending upon qualification.

Post Doc # 2

Duration:

24 months (possibly extended to 36 month)

Activity:

The activities will be mainly related to the preprocessing and analysis of neuroimaging data as wellas validation, via systematic statistical testing, of effective connectivity models on animal data as wellas on stroke patients. In particular, the post-doc will be involved in the design of experiments andconduct human neuroimaging research on normal brain organization and changes in networkarchitecture among patients with stroke, with an emphasis on effective and functional connectivitynetwork mapping. The post-doc will compare the human results with those he/she will obtain workingwith whole-brain rs-fMRI signals from the animal model.

Profile:

The position is open to recent PhDs in applied mathematics/physics, computer science, engineering,statistics and related fields, with demonstrated ability to conduct high impact research. The successfulapplicant will have expertise in anatomical MRI, dMRI and/or rs-fMRI analysis, familiarity withcontrol theory and system identification, time-series analysis, statistics and graph theoretic andnetwork modeling. Expertise in vivo electrophysiology signals analysis is also desirable.Experience with neuroimaging analysis programs (ANTs, FSL, SPM, FreeSurfer or other relevantprograms), and strong knowledge on programming (e.g. good command of scripting, Python andMatlab) is also expected.Clearly, the successful candidate will be part of a diverse and multidisciplinary group includingengineers of different specialties, neuroscientists, physicists, therefore a strong attitude and

flexibilityin team-working are required to foster cross-breeding and fertilization among the different disciplinesinvolved in the project.

Salary:

25k to 30k Euro per year depending upon qualification.