RESEARCH, INNOVATION AND DISSEMINATION CENTER FOR NEUROMATHEMATICS – NEUROMAT

FAPESP Process 2013/07699-0

The Research, Innovation and Dissemination Center for Neuromathematics (NEUROMAT) aims to integrate mathematical modeling with basic and applied lines of research at the frontier of neuroscience. There is an increasing importance of mathematical structures in theoretical neuroscience: the analysis of huge datasets generated by recent experimental developments requires new mathematical tools. Furthermore, the development of suitable mathematical languages and structures is essential to develop theories explaining the underlying phenomena and yielding testable predictions.

Neuroscience is at a crossroads, triggered by an imbalance between prowess in data collection and humbleness in theoretical understanding, a situation that has been nicely described as data-rich yet theory-poor. Mathematics is the bridge that can integrate observations and explanations.

NEUROMAT will put together a first-class team of mathematicians, computer scientists, neuroscientists and rehabilitation clinicians. The research structure is designed to fulfill several requirements: 1) researching must not be reduced to a particular area of mathematics (therefore, the team includes mathematicians with different specialties); 2) leading to models that help to understand actual phenomena, and not just to convenient phenomenological descriptions (here, the objective is to achieve understanding and predictive power in applied areas of neuroscience, therefore, the team includes experts in neuronal data recording and neurological diseases); 3) producing efficient algorithms and procedures that can be put to use on real data (therefore, the team includes a number of computer scientists); 4) leading to products useful for medical professionals and public health programs (therefore, the team includes specialists in neurorehabilitation and public policies for cerebral stroke patients).

Photo by Juan Ojea

The Research, Innovation and Dissemination Center for Neuromathematics (NEUROMAT) integrates the development of new mathematics with basic and applied research at the frontier of neuroscience (Photo by Juan Ojea)

The technological transfer and innovation aspects will focus on products needed for public health programs in neurorehabilitation, including the design and analysis of a standardized data bank and the development of tools to support clinical diagnostics, decision and follow up.

For dissemination, the project includes courses and filmed workshops addressed to students at all levels, public school teachers and journalists.

Host Institution

University of São Paulo (USP, campus São Paulo)

Associated Institutions

State University of Campinas (UNICAMP)
University of Buenos Aires, Argentina
Regional Council on Statistics – SP
Federal University of Rio Grande do Norte (UFRN)
Rockfeller University, United States
Institute of Pure and Applied Mathematics (IMPA)
Federal University of Rio de Janeiro (UFRJ)
University of Memphis, United States
Watson Research Center, United States
University of San Andrés, Argentina
University of the Republic, Uruguay
Harvard Medical School, United States
Centre National de la Recherche Scientifique (CNRS), France
Federal University of ABC (UFABC)

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