INCF NEWSLETTER

September/October 2008

INCF activities

Access to a Blue Gene supercomputer for the neuroinformatics community

Scientists involved in large-scale computing projects are invited to apply for usage of the INCF share of the Blue Gene/L IBM supercomputer (BG/L). The BG/L is located at the Parallel Computing Center (PCD) of the Royal Institute of Technology (KTH), in Stockholm, Sweden. Projects will be evaluated and approved based on availability and usage load of the computer.

The BG/L supercomputer

INCF Travel Grants: Facilitating collaborative projects

The INCF is initiating a travel grant scheme, making resources available to researchers for study visits of relevance for INCF Programs. Everyone is eligible to apply, but priority will be given to applicants from the INCF member countries and projects enhancing collaboration among INCF National Nodes.

You can apply for Blue Gene access and travel grants here:

http://incf.org/services

INCF at FENS FORUM 2008

INCF had a booth at the FENS meeting and welcomed 6 neuroinformatics projects. Visitors could play with a two-neuron educational model and were introduced to the CARMEN and FIND initiatives, both facilitating sharing and analysis of electrophysiology data. NetMorph and Neuron allowed for some high-level simulations. There were also demonstrations of 3DAtlas, a tool for mouse and rat brain atlasing, and BAMS, the Brain Architecture Management System incorporating data about brain parts, molecules, cell types, and connections between brain regions and cell types.
In addition, the INCF organized a Neuroinformatics Social event where Rodney Douglas chaired a discussion about the challenges and benefits of neuroinformatics. Invited discussants were Alain Berthoz, Michael Hines, and Colin Ingram. The event concluded with a live demonstration of two biologically inspired robot models, by Auke J.Ijspert and Alessandro Crespi.

Demonstration at the INCF booth

The INCF Software Center

Tools for visualization, analyses, and modeling of the structure and function of the nervous system

The INCF Software Center was officially released this summer at the FENS FORUM 2008, in Geneva. INCF booth visitors had the opportunity to get familiar with the software center and provide useful feedback to the portal development team. With already more than 30 tools and an increasing number of new users, the software center is still under development, aiming to attract more neuroscientists by its quality of services.

Neuroscientist software user

- find software tools
- evaluate them
- make use of them
- share experiences

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Neuroscientist software developer

- publish software
- track the use of it
- receive feedback

Where your code becomes a resource: http://software.incf.org

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INCF National Nodes

The Bernstein Network and the German node

http://www.neuroinf.de/

Germany, one of the founding members of the INCF, has taken bold new steps to unite its expertise in theoretical and experimental neuroscience, with the aim to expedite research process. With financial support from the Federal Ministry of Education and Research, Germany has brought together a critical mass of talent in their National Bernstein Network for Computational Neuroscience that was initiated in 2004. The network is named after Julius Bernstein (1839 - 1917), the German physiologist who provided the first biophysical explanation for how nerve cells encode and transmit information by electrical currents.

In more than 180 interdisciplinary research groups mathematicians, physicists, biologists, psychologists, physicians and engineers work hand in hand to identify principles of brain function and translate them into a mathematical representation. They complement each other with their respective expertise; they look at questions from different angles, with all sides benefiting from the views and ideas of the others. Funding on a network basis makes it possible to define new aims and to translate them into joint research projects.

The German INCF node (G-Node) is focusing on neurophysiological data, developing a novel software and hardware infrastructure that eases the acquisition, storage, and analysis of experimental data. The focus will be on cellular and systems neurophysiology for a number of reasons. First, the lack of common data standards is rather severe in this field; as a consequence, successful standardizations could have an enormous impact. Second, the complexity of this task goes beyond the capability of a single lab but can be tackled through a concerted effort. Third, without a thorough quantitative understanding of cellular and systems neurophysiology, there is no solid foundation for computational neuroscience and brain theory. In addition, the methodology and tools developed within the project could later also be used in other neuroscience areas.

Research themes of the Bernstein Network

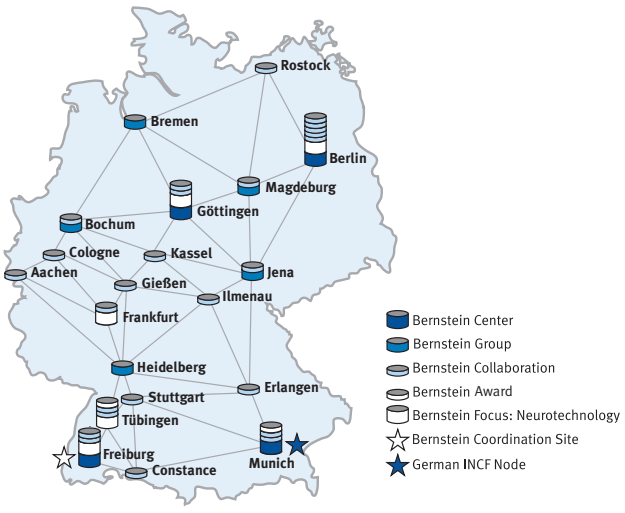
Basic Research:

- How does the brain process information?
- Sensing and perceiving, attention
- Control of movements and behavior
- Pain
- Development and reorganization of the brain
- How do thoughts arise? Can we read thoughts?
- Learning and memory
- Computer simulations of the brain
- New techniques and methods

Applications:

- Health: clinical neuroscience e. g. epilepsy, brain-computer interfaces, prosthetics
- Technology: intelligent robots, new IT technologies

Visit the Bernstein Network booth at the Neuroinformatics 2008 congress, in Stockholm, September 7 - 9, 2008.



The Bernstein Network

The Bernstein Network

The core elements of the Bernstein Network Computational Neuroscience are the four Bernstein Centers for Computational Neuroscience in Berlin, Freiburg, Göttingen and Munich. The network is complemented by 'Bernstein Partner' projects, consisting of five Bernstein Groups and eleven Bernstein Collaborations. The annual Bernstein Award allows young researchers to establish their own, independent research group. An additional Bernstein Focus: Neurotechnology in the regions Berlin, Frankfurt (Main), Freiburg/Tübingen and Göttingen is currently in preparation. The National Bernstein Network for Computational Neuroscience is funded by the Federal Ministry of Education and Research (Germany).The Bernstein Coordination Site centrally manages and coordinates the network's activities. Further information: www.nncn.de

Neuroinformatics around the world

Neuroinformatics Congress 2008 Databasing and Modeling the Brain

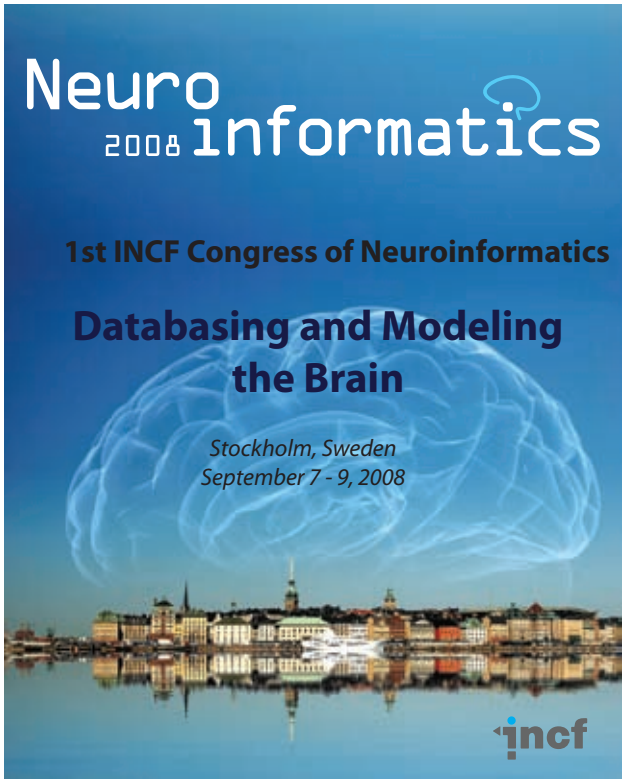
www.neuroinformatics2008.org

Neuroinformatics 2008 is the first meeting focusing on this emerging field that is officially defined as: *"'combining neuroscience and informatics research to develop and apply the advanced tools and approaches that are essential for major advances in understanding the structure and function of the brain."*

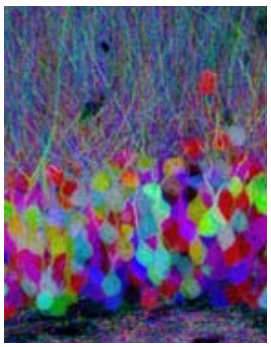
With a broad international outreach, the congress brings together an exceptional combination of expertise from all disciplines contributing to neuroinformatics. Neuroinformatics 2008 aims to facilitate dissemination of recent progress and the building of a strong and vibrant community.

The congress is organized as a single track event, with keynote speakers, workshops, poster sessions, and 26 live demos of neuroinformatics applications. The keynote lectures cover topics such as synaptic nanomachines, digital age perspective of neuro-reserach, and brain-robot function translations. In addition to invited speakers, all workshops include short presentations selected from abstract submissions and allow time for an open panel discussion.

A special session has been dedicated to perspectives in



funding research in neuroinformatics. Kathie Olsen, NSF Deputy Director, and Wolfgang Boch, head of "Future and Emerging Technologies" unit, European Commission, will outline success stories and opportunities from the US and European perspectives respectively.



Keynote speakers:

Mark Ellisman - Brain Research in the Digital Age
David van Essen - A neuroinformatics perspective on cerebral cortex structure and function
Mitsuo Kawato - Towards manipulative neuroscience based on the Brain-Network-Interface
Mary Kennedy - Synaptic Nanomachines
Henry Markram - The Blue Brain Projet
Idan Segev - Towards an Objective Analysis of the Firing Variability of Cortical Neurons

Videos of the keynote lectures available through www.neuroinformatics2008.org

Workshops:

Future hardware challenges to scientific computing
Erik De Schutter - G. Wittum, M.O. Gewaltig, J. Shalf

Neurogenomics meets bioinformatics meets neuroinformatics
Robert Williams - E. Lein, S. Grant, K. Harris

Extraction of structural and functional information from brain images
Ulla Ruotsalainen - K.Amunts, A.Evans, T. Mrsic-Flögel

Challenges and benefits of multichannel electrophysiology
Andrezj Wrobel - G. Buzsaki, X. Wang, M. Nicolelis

Did you know...

...that the INCF will be at the SfN 2008 meeting in Washington DC?

You are welcome to booth #3226 for scientific demonstrations from invited participants and a hands-on experience of the INCF Neuroinformatics Portal. A detailed program will be availabe soon at www.incf.org.

Neuroinformatics Profiles

Gaute Einevoll

As a coordinator of the INCF's Norwegian National Node, theoretical physicist Gaute Einevoll entered the neuroinformatics field in a rather unconventional manner: through a roommate. In the early 1990s, during his postdoc in the physics department at the University of California, San Diego, Einevoll happened to share an apartment with Anders Dale, then a cognitive science PhD student at UCSD and now neuroscience and radiology professor at UCSD.

"He introduced me to neuroscience," Einevoll said of Dale. "I got convinced that my training in mathematical modeling of nature could be useful in neuroscience." The revelation caused Einevoll to switch scientific fields and later led him to create a computational neuroscience group at the Norwegian University of Life Sciences, where he is a professor in the physics department.

His current projects include modeling the nervous system at several levels of detail. Einevoll and his research team rely on free, publicly-available software including Neuron for compartmental modeling and NEST for simulation of large networks. His group has also given back to the software community by creating new features to existing software systems.

Einevoll emphasizes that collaboration and sharing of software is essential for the nascent neuroinformatics field to move forward, but he acknowledges certain obstacles that limit growth.

"The major challenge for the field is to develop a culture for efficient collaboration between modelers and experimentalists," Einevoll said. Coming from the collaboration-friendly physics field, he was surprised that the neuroscience community lacked "a culture for data sharing." In physics, Einevoll said, "experimental scientists are thrilled when modelers use their data to obtain new insights." The collaborations often result in shared glory, such as Nobel Prize-winning discoveries, he said.

In contrast, Einevoll says that much neuroscience data is left unanalyzed, or at least underanalyzed, and languishing on hard drives in various neuroscience labs. "There are certainly practical issues that must be sorted out to allow for efficient data sharing," Einevoll said. "But it seems to me, the main problem is cultural."

Einevoll is optimistic that efficient data sharing will take hold in the neuroinformatics community. He envisions that cheap computers and internet will enable

Gaute Einevoll

researchers worldwide to collaborate, and researchers in developing nations will be able to participate in the neuroinformatics community by working on experimental data sets recorded in richer, more developed nations. "Developing countries have a lot of young and eager brain power that could be unleashed," he said, listing free, online journals such as PLOS and the Frontiers series as another important aspect of bolstering science worldwide.

By promoting and coordinating international collaboration and developing neuroinformatics tools, the INCF has a significant role in helping researchers obtain the tools they need. These tools include a network of scientists. "Norway with less than 5 million people is simply too small for forming a viable, independent neuroinformatics community," said Einevoll, who has shared leadership of the Norwegian node of the INCF with Johan Storm of the University of Oslo since last year. "The possibilities for international collaboration offered by the INCF are very welcome," he said. In fact, the Norwegian INCF node has partnered with the Polish INCF node to develop tools for modeling and analysis of multi-electrode data. The partners plan to jointly organize a workshop on the topic next year.

"The major challenge for the field is to develop a culture for efficient collaboration between modelers and experimentalists".

In addition to his contributions to neuroinformatics, Einevoll prioritizes communicating his science to the lay media. "These days, young bright minds have lots of interesting career possibilities, and we have to demonstrate to them that what we do is both personally rewarding and important for the world," he said, adding how popularizing science is a lot of fun. Einevoll has written two popular physics books and about 20 popular science articles, organized the popular science website fysikknett.no, has given 50-some talks to non-scientists and has had media coverage on TV, radio and in print.