

INCF NEWSLETTER July/August 2008

INCF activities

Standards and Guidelines Effort in two INCF Programs



Robert Williams



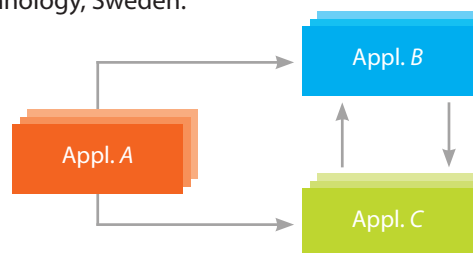
Erik De Schutter

Two oversight committees have been established to focus on standards and guidelines in the areas of Large-Scale modeling and Brain Atlasng. They are headed by Erik De Schutter, PI at the Computational Neuroscience Unit in Okinawa, Japan, and Robert Williams, PI at the University of Tennessee, Memphis USA, respectively. Each committee consists of approximately 10 prominent experts in the field, who will determine the overall scope and organization of the effort, monitor progress, and set up Task Force(s) to execute concrete actions. In large-scale modeling the initial focus will be on integrate-and-fire network modeling.

The MUSIC project: Comments to the RFC

The MUSIC (multi-simulation coordinator) was presented at the FACETS (CodeJam) meeting and has started receiving useful comments. The Requests For Comments (RFC) document is available here <http://www.incf.org/documents/music-rfc.pdf> and is inviting anyone in the community to provide comments through the following mailing list: music-rfc@incf.org

The aim of the MUSIC project is to provide a standard software interface for communication between parallel applications for large scale modeling simulation of neural networks. It is being developed under the leadership of Örjan Ekeberg and Mikael Djurfeldt, at the Royal Institute of Technology, Sweden.



Schematic representation of the communication between parallel applications

Neuroinformatics at FENS Forum

The INCF is participating at the FENS meeting. Come and visit us at the INCF booth no.328 and attend the live demonstrations!

Special interest social event

Tuesday July 15, 18:30 – 20:30 Palexpo conference center, room Cervin. A get-together for neuroinformaticians and anyone who would like to have a drink with us!

Featuring:

Two robotic guests: the Amphibot and Salamandra Robotica. Special guests discussing 'Why should neuroscientists want to take advantage of neuroinformatics?'

Join us for mingling and informal discussions!



INCF National Nodes

Japan Node and Platforms

As a node of INCF, the Neuroinformatics Japan Center (NIJC) was established in RIKEN –Brain Science Institute (BSI), located in Saitama (near Tokyo), Japan, in April 2005. NIJC organizes Japanese activities in neuroinformatics (NI) research and also participates in the international network of INCF. The node steering group has a national representation and is responsible for the dissemination of INCF activities in Japan. NIJC activities focus on the development and support of NI tools and systems -such as the base platform XooNIPS- and NI platforms under a portal umbrella at <http://www.neuroinf.jp>

Japan Node Platforms

- **Visiome:** Visiome Platform (VP) integrates information associated with research on vision (e.g. the retina, psychophysics, and higher-level visual functions) and makes this data publicly available.
<http://platform.visiome.neuroinf.jp/>
- **Neuron/Glia:** The Neuron-Glia Platform integrates accumulating knowledge on the complex interactions between neuron and glia, including the activities of associated functional proteins.
<http://platform.neuron-glia.neuroinf.jp/>
- **BMI:** Brain Machine Interface Platform (BMI PF) accumulates BMI (Brain Machine Interfaces)-related experimental data, mathematical models, and tools generated in neuroscience, computational theory, and robotics.
<http://platform.bmi.neuroinf.jp/>



The portal for neuroinformatics in Japan



- **IVB PF:** Invertebrate Brain Platform integrates experimental data, mathematical models, and research tools relevant to the study of invertebrate brains, neurons, and behavior.
<http://platform.invbrain.neuroinf.jp/modules/tinyd0/>
- **CDT-DB:** The Cerebellar Development Transcriptome Database provides spatio-temporal gene expression profile information on the postnatal development of mouse cerebellum. It seeks to reproduce the genetic blueprint of cerebellar development.
<http://www.cdtdb.brain.riken.jp/CDT/Top.jsp>
- **IBR:** Integrative Brain Research (IBR) Project is a grant group of neuroscientists that consists of 5 subgroups (“Integrative Brain Research”, “System study on higher brain functions”, “Elucidation of neural network function in the brain”, “Molecular Brain Science”, “Research on Patho-mechanisms of Brain Disorders”).
<http://www.togo-nou.nips.ac.jp>
- **Cerebellum:** Cerebellar Platform is a digital research archive focusing on cerebellar research and its role in motor learning.
<http://platform.cerebellum.neuroinf.jp/>
- **NIMG:** This platform collects information about neuroimaging research and provides them to researchers all over the world. You can access bibliographic information of text book and peer reviewed journal papers, including the stimuli, analysis software, and raw data in neuroimaging experiments (e.g. fMRI, MEG, NIRS).
<http://platform.nimg.neuroinf.jp/>
- **Dynamic Brain:** Dynamical models of the brain (under development).

High-level data sharing

These platforms include specialized databases of published and unpublished experimental data, paper and textbook references, mathematical models, tools for analysis, pictures and movies, URLs, tutorials in a specific field and a variety of NI software. They are designed in a way to promote interaction among scientists from different fields and sharing of new findings and ideas in order to facilitate exploration and interpretation of complex brain functions.

Neuroinformatics around the world

UK: The CARMEN project

Funded by the UK Engineering and Physical Sciences Research Council, CARMEN (Code Analysis Repository & Modelling for eNeuroscience) is developing a virtual laboratory for neurophysiologists studying the electrical signaling activity of neurons through techniques such as multi electrode array recording and spike train analysis. The project – which is in the pilot stage – aims to allow a diverse, distributed community of neuroscientists to share data, software code and expertise. Over 40 scientists at 11 UK universities are engaged in CARMEN's development and prototypical use.

The challenge

With more than 100,000 neuroscientists studying the CNS, massive, complex datasets are rapidly accumulating. However, the expertise required to fully understand these datasets is rarely concentrated within the same laboratories, or even in the same country. Similarly, laboratories based in many different locations may be archiving data which could be combined to make dramatic new discoveries. A virtual laboratory, leveraging the world-wide web, could potentially make all of these resources available in any location.



Scientists working on the CARMEN project

Key features of a virtual laboratory

The CARMEN virtual laboratory is a Service Oriented Architecture, consisting of a federation of server nodes. Data and analysis programs are stored on the nodes, and can be accessed remotely, so that large datasets need not be downloaded to perform analyses. Users access the laboratory with a standard web browser. A core feature of the laboratory is metadata – controlled, descriptive markup for data and programs, ensuring that both resources and the conditions in which they were created can be widely understood. Resources can also be secured to restrict access to users known by the owner.

My data is your data?

CARMEN aims to allow users to archive data and pro-



CARMEN

ENHANCING COLLABORATION
IN NEUROSCIENCE

grams, which they may choose to make available to their collaborators. In the long term, CARMEN's viability depends upon the widespread accessibility of resources, as a large user community is required to achieve longevity. This presents social challenges, in addition to the technical ones. Concerns expressed by potential CARMEN users are described in a paper to be presented at the 6th International Meeting on Substrate-Integrated Micro-electrodes in 2008.

<http://www.carmen.org.uk/publications/carmen-virtual-laboratory-mea-2008.pdf> (paper)

<http://www.nmi1.de/meameeting2008/> (meeting)

One common concern is that neuroscientists may not feel motivated or obliged to annotate data with highly detailed protocols describing how resources were created. Scientists may also worry that they will not receive credit when their resources are used by someone else, or that other researchers might discover inconsistencies and other errors. Competition to produce journal publications, which make data and findings public over a relatively slow cycle, may also prevent neuroscientists from making full use of the capabilities of CARMEN to share their resources on a day-to-day basis.

Despite these worries, resource sharing initiatives are gaining momentum and beginning to make a real impact on neuroscience culture. Germany has its FIND project, Japan has Node, and the United States' National Science Foundation has data sharing programs.

"Building on the work of these national initiatives, there is an opportunity to address global, communal meta-data standards, allowing resources embedded in many different systems to be utilized in an integrative manner," the CARMEN project partners concluded in their paper presented at the Substrate-Integrated Microelectrode Arrays meeting, in Reutlingen, Germany, July 2008.

Did you know...

...that RIKEN and CARMEN organized a joint workshop on Developing Web Services for Neurophysiological Data? It took place March 17-18, 2008, at the RIKEN institute and was an occasion for representatives from the Japan and UK INCF national node to meet and discuss possible areas of collaboration.



David C. Van Essen

Neuroinformatics Profiles

David Van Essen

A pioneer in neuroinformatics, David Van Essen has helped develop tools including brain-mapping software and the SumsDB database for neuroimaging data. Like how bioinformatics has helped fields in molecular biology, Van Essen says that “neuroinformatics has the potential to provide comparably powerful tools for data mining of the far more complex and diverse datasets that emerge from neuroscience research.”

Van Essen, past president of the Society for Neuroscience and head of the Department of Anatomy & Neurobiology at Washington University School of Medicine, believes that the emerging neuroinformatics field has yet to have a profound breakthrough. “One breakthrough that I feel is on the horizon is the emergence of digital brain atlases and associated databases as tools for mining neuroimaging data,” he said.

The tremendous complexity of neuroscience data represents that greatest challenge for neuroinformatics, Van Essen said. The brain’s 3-D structure, connectivity, functional organization and how it develops and how its function can go awry all add to the complexity of neuroscience data. “I believe that neuroinformatics will play a key role in providing the infrastructure that allows neuroscientists to efficiently inte-

grate information of diverse types, obtained across diverse platforms,” Van Essen said. “Coordination of diverse efforts in neuroinformatics is critical for making these tools more efficient and useful to the community.”

Selected positions and honors

- 1973-1975: Research Fellow with Dr. J.K.S. Jansen, Institute of Physiology, Univ. Oslo, Oslo, Norway
- 1975-1976: Research Fellow with Dr. S.M. Zeki, Dept Anatomy, University College, London, England
- 1976-1979: Assistant Professor, Division of Biology, California Institute of Technology
- 1979-1984: Associate Professor, Division of Biology, California Institute of Technology
- 1984-present: Member of the editorial board of a dozen scientific journals, including Editor-in-Chief of the Journal of Neuroscience
- 1986-1992: Option Representative, Computation & Neural Systems Program, CALTECH
- 1996-2000: Organization for Human Brain Mapping (Chair, 1998; Councilor, 1997-2000; Treasurer, 1999)
- 1994-present: Fellow, American Association for the Advancement of Science
- 1992-present: Edison Professor of Neurobiology and Head, Department of Anatomy and Neurobiology, Washington Univ. Sch Med; Director, Washington Univ. McDonnell Center Higher Brain Function
- 2004-present: Member, Neuroinformatics Committee, Society for Neuroscience
- 2005-2008 President-Elect, President, and Past President, Society for Neuroscience

1st INCF Congress: Databasing and Modeling the Brain



The INCF is organizing the first neuroinformatics congress, in September 7-9, 2008, in Stockholm, Sweden. It is organized as a single track event, with 6 keynote speakers, 5 workshops and one special session, as well as two poster & demo sessions, with more than 100 participants. You can still register at <http://www.neuroinformatics.org>