P02

INCF National Node of Finland: Activities and Pilot Projects

Location

Department of Signal Processing,
Tampere University of Technology

TTY Kuva-arkisto

Personnel

Chair: Prof. Ulla Ruotsalainen
Coordinator: Dr. Marja-Leena Linne
Steering group: Nine members
from all major Finnish universities

Vision

To strengthen the networking between Finnish neuroscientists and computer scientists.

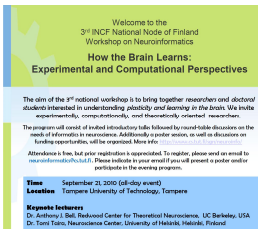
Action plan in 2010-11

Education-oriented activities

1. National workshops
2. Nordic course
3. Web-based learning course
4. Popularized science articles
5. Support for pilot neuroinformatics projects

Networking-oriented activities

1. Interviews of Finnish groups
2. Active follow-up and participation of INCF activities, workshops, and node meetings
3. Active search for collaborations with other nodes.



Previous workshops organized by INCFF (INCF National Node of Finland):
2007: 5th Nordic Neuroinformatics Workshop
2008: INCFF Imaging Brainstorm – The Resting Brain: What happens when nothing happens?
2009: INCFF Imaging Brainstorm – The Resting Brain: Still nothing happens?

Nordic course on neuroinformatics: "From measurements to modeling"

Aims

The aim of the Nordic Course on Neuroinformatics is to establish a strong connection between measurement techniques and the modeling strategies, thereby complementing the existing international courses.

The course will cover topics from neuroimaging, electrophysiology, and data analysis to explaining network level functions in vitro and in vivo by modeling means.

Organizers:
Jeanette Hellgren Kotaleski (Royal Institute of Technology, Stockholm, Sweden)
Gaute Einevoll (Norwegian University of Life Sciences, Ås, Norway)
Marja-Leena Linne (Tampere University of Technology, Tampere, Finland)

Content

Measurements
- Calcium imaging (tutorials on available methods)
- Electrophysiology (tutorials on available methods)
- State-of-the-art lecture on connectivity and morphology

Data analysis
- Calcium imaging (tutorials on available methods and tools)
- Electrophysiology (tutorials on available methods and tools)

Modeling
- Cellular level models (lectures on available methods/tools)
- Network models (lectures on available methods/tools)
- State-of-the-art lecture on modeling extracellular field potentials

Practical issues

1. Time: late spring 2011
2. Duration: 5 days
3. Location: Tampere
4. Participants: graduate students (and advanced undergraduate students) with *background in physics, mathematics, computer science, and engineering.*
5. Funding: lecturers and tutors will be covered by INCFF; travel and accommodation of students have to be supported by own institutions.

Demos and exercises

Planned demos
1. Automated image analysis on specific features of cell cultures
2. MEA recordings: analysis and interpreparation
3. Extracellular potentials: analysis and interpretation

Planned hands-on exercises
1. Modeling network activity using NEST simulator
2. Modeling network growth using Netmorph and CX3D simulators
3. Modeling single cell activity using Neuron simulator

Web-based learning course

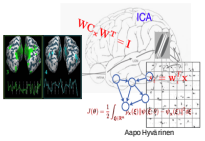
Tool for education.

Prepared initially for the nordic course, but will be publicly available after the course for independent training of researchers, possibly through INCF portal.

Neuroinformatics in Finland

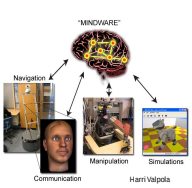
Based on the large survey done in 2008-09:

Neuroimaging: about 10 relatively large research groups
Computational neuroscience: three small research groups
Neuroengineering: one research group

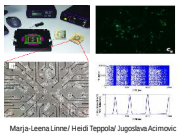


Aapo Hyvärinen

University	Group leader	Research interests	Neuroinformatics
Univ. of Helsinki	Prof. Aapo Hyvärinen	Visual system	• Statistical data analysis • Probabilistic statistical models • ICA
Univ. of Helsinki	Dr. Matias Palva	Systems-level mechanisms of perception, cognition, and action in the human brain	• Unified framework for acquisition, storing, analysis, and sharing of large databases of experimental recordings (fMRI)
Aalto University, School of Science and Technology	Prof. Riitta Hari	Social interactions and cognitive neuroscience	• MEG in cognitive processing and parametric modeling • ICA for spontaneous EEG/MEG analysis
Aalto University, School of Science and Technology	Prof. Riitta Salmelin	Neural organization of language (function and dysfunction)	• Methodological development for imaging and analysis
Aalto University, School of Science and Technology	Prof. Mikko Sams Dr. Iiro Jääskeläinen	Cognitive neuroscience, auditory processing	• Neurocinematics with fMRI • MEG data analysis • Method development
Aalto University, School of Science and Technology	Dr. Harri Valpola	Computational cognitive neuroscience and robotics	• Predictive motor control, attention, • Reinforcement learning, modeling • *ZenRobotics Ltd.*
Univ. of Turku, PET Center	Prof. Juha Rinne	Brain (dys)functions	• PET and MR imaging • Databases
Univ. of Turku, PET Center	Prof. Jarmo Hietala	Neuropsychology	• PET and MR imaging • Databases
Tampere Univ. of Technology	Prof. Ulla Ruotsalainen Dr. Jussi Tohka	Neuroimaging	• Reconstruction of images • Parametric modeling • Deformable meshes for surface extraction • *XooNIps-platform for data storage and sharing*
Tampere Univ. of Technology	Dr. Marja-Leena Linne	Cellular level computational neuroscience	• Modeling of neuronal reaction-kinetics, excitability, and growth • Development and evaluation of stochastic simulation tools
Univ. of Kuopio	Prof. Asla Pitkänen	Neurodegenerative diseases	• Imaging (SPECT) • Databases
Univ. of Kuopio	Prof. Garry Wong	Neurodegeneration (esp. in C. elegans)	• Data analysis for microarray images • Bioinformatics tools
Univ. of Oulu	Dr. Vesa Kiviniemi	BOLD fMRI imaging and spontaneous cortex activity	• ICA and other data analysis methods
Univ. of Oulu	Prof. Matti Weckström Dr. Mikko Vähäsöyrinki	Insect visual system	• Modeling the information processing by graded potentials in neurons



Ulla Ruotsalainen/ Jussi Tohka



Marja-Leena Linne/ Heidi Teppola/ Jugoslava Acimovic

Neuroinformatics pilot project: XooNIps-platform for data storage and browsing

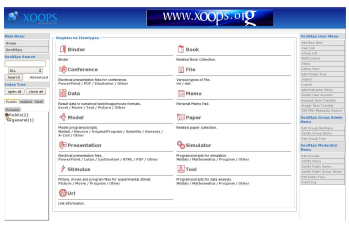
Introduction

INCFF initiated XooNIps platform (http://xoonips.sourceforge.jp/) –based neuroinformatics pilot project for data storage, sharing, and browsing in 2009. The main goal of the pilot project was to study the XooNIps platform in order to test its suitability in storing research related publications and associated information (measured and simulated data, metadata, etc.). This kind of information is not only needed by the research laboratories themselves for sharing and browsing information from previous research projects but also by the whole research community to more effectively share research resources.

Goals

1. To study the structure of database
2. To study the user-interface
3. To assess the suitability of XooNIps as a storage repository
4. To address the specific needs of research labs.

PET research lab was then selected to be used as an example project: specific publications were linked to different types of data that were originally used to produce the publications (measured data, simulated data, phantom data, patient data, metadata, etc.)



Conclusions

As a result of the pilot project it was concluded that XooNIps platform is able to perform well in basic data uploading and linking tasks. The suitability of the tool for specific neuroinformatics tasks in specific groups, such as uploading large files, still needs further examination. The system is taken into use in M2oBSI research group (http://www.cs.tut.fi/sgn/m2obsi/) at Tampere University of Technology, Finland.

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Web pages : http://www.cs.tut.fi/sgn/neuroinfo/

Funding: Academy of Finland and Tampere University of Technology.