Neuroinformatics combines 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.

INCF is an international organization devoted to advancing the field of neuroinformatics

Live demonstrations at the **INCF booth #624** at FENS in Amsterdam!

Sunday, July 4

morning (10:00 - 13:00)

RELACS, odML, and LabLog - software for closed-loop and dynamic clamp electrophysiological experiments, metadata exchange and management
Jan Benda and Jan Grewe

afternoon (14:00 - 17:00)

MUSIC: Run-Time Interoperability between Neuronal Network Simulators
Johannes Hjorth, Mikael Djurfeldt, and Örjan Ekeberg

Monday, July 5

morning (10:00 - 13:00)

The INCF Digital Atlasing infrastructure
Raphael Ritz, Janis Breeze and the INCF Digital Atlasing Taskforce

afternoon (14:00 - 17:00)

Implementing SignalML in SVAROG - Signal Viever, Analyzer and Recorder on GPL
Joanna Jędrzejewska-Szmek, Dobiesław Ircha, Zbyszek Jędrzejewski-Szmek, Tiziano Zito, and Piotr Durka

Tuesday, July 6

morning (10:00 - 13:00)

Neural masses on a cortical mesh for co-registered EEG/fMRI prediction
Ingo Bojak, Thom F. Oostendorp, Andrew Reid and Rolf Kötter

afternoon (14:00 - 17:00)

ScalableBrainAtlas.incf.org
Rembrandt Bakker and Rolf Kötter

Wednesday, July 7

morning (10:00 - 12:00)

Open House
Anyone is welcome to give a spontaneous demonstration!

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What's *your* image of neuroinformatics?

INCF Image Competition
incf.org/ImageCompetition

Sunday morning, July 4, 10:00-13:00

RELACS, odML, and LabLog - software for closed-loop and dynamic clamp electrophysiological experiments, metadata exchange and management

Jan Benda and Jan Grewe
Ludwig-Maximilians-Universität München, Germany

RELACS ("Relaxed ELectrophysiological data Acquisition, Control, and Stimulation") is a fully customizable software platform for data acquisition, online analysis, and stimulus generation specifically designed for electrophysiological recordings. Filters and spike detectors can be applied instantly on the recorded potentials. Freely programmable, hardware independent C++ plugins can access the preprocessed data for further online analysis and visualization. Therefore the experimental protocols can automatically adapt a stimulus (e.g. offset, variance, etc.) in a closed loop fashion and thus completely control the running experiment.

The dynamic clamp is a closed-loop experiment on a per sample basis where each sampled value of the cell's membrane potential is used to compute a current that is injected back into the cell. RELACS supports software dynamic clamp, i.e. no additional hardware is needed, that is implemented as an RTAI real time Linux kernel module.

For analysis, management, and sharing of experimental data, metadata that provide information about data acquisition and experimental conditions are indispensable. Computer-based analysis and data management requires this meta information to be stored and exchanged in machine-readable form. We propose a simple format, the "Open meta-Data Markup Language" (odML) for metadata. This format specifies a hierarchical structure for storing arbitrary meta information as extended key-value pairs, so called properties, which can be logically grouped into sections and subsections. The odML defines the format, not the content, so that it is inherently extensible and can be adapted flexibly to the specific requirements of any laboratory.

Since RELACS knows about most of the metadata, it automatically stores this important information as an odML file directly to disk. This data can then be directly imported by data management and analysis software or uploaded to a public data server, such as the one provided by G-Node (www.g-node.org). For lab-internal data management we developed LabLog, the laboratory logbook.
This tool assists the scientist currently working on a project to keep track of and to retrievef the recorded data.

For more information and downloads visit http://www.relacs.net and http://lablog.sourceforge.net/.

Sunday afternoon, July 4, 14:00-17:00

MUSIC: Run-Time Interoperability between Neuronal Network Simulators

Johannes Hjorth, Mikael Djurfeldt, and Örjan Ekeberg
Vrije Universiteit, Amsterdam and Royal Institute of Technology, Stockholm

MUSIC is an API allowing large scale neuron simulators to exchange data within a parallel computer during runtime. It promotes inter-operability between models written for different simulators and allow these to be re-used to build a larger model system, a multi-simulation. MUSIC provides mechanisms to transfer massive amounts of event information and continuous values from one parallel application to another. Since the API enforces independence of the applications, the multi-simulation can be built from pluggable component modules without adaptation of the components to each other in terms of simulation time-step, data allocation strategies or topology of connections between the modules. Special care has been taken to ensure that existing simulators can be easily adapted to MUSIC. A prototype implementation of the API in the form of a C++ library was released under the GPL license early 2009. It is part of major Linux distributions and can be downloaded from the INCF Software Center.

Monday morning, July 5, 10:00-13:00

The INCF Digital Atlasing Infrastructure

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INCF Secretariat

Monday afternoon, July 5, 14:00-17:00

Implementing SignalML in SVAROG - Signal Viever, Analyzer and Recorder on GPL

Joanna Jędrzejewska-Szmek, Dobiesław Ircha, Zbyszek Jędrzejewski-Szmek, Tiziano Zito, and Piotr Durka
University of Warsaw and Humboldt-University Berlin, Germany

Different data storage formats created by hardware vendors cause obvious problems in sharing the research results between laboratories using different hardware or even performing research in one laboratory with various hardware devices. The most common idea for a solution is to establish one standard file format for EEG data. An alternative to this idea is to design a language that would describe all the available data formats eliminating the need for conversions and duplication of data. An implementation of this idea is SignalML --- an XML-based, declarative language to describe the structure of binary data files holding time series.

SignalML is one of the main features and advantages of SVAROG. SVAROG is an acronym for Signal Viewer, Analyzer and Recorder on GPL. SVAROG is a multi-platform, open source software, implemented in Java, with friendly user interface and modular architecture. Apart from basic functionality covered by any advanced signal viewer it introduces some novel features. It can store and display data in various file formats by leveraging the external descriptions of specific formats in SignalML. It also provides an easy XML-based way for showing and exporting signals tags, marks and annotations.

Open source licensing and a modular architecture should facilitate scientific cooperation. Anyone can dissect the algorithms used in the software. Due to modular architecture plug-ins to perform specific computations on the signal can be added easily without the need to bother with data input/output or displaying the results. Connecting new hardware devices as sources of data is possible, as long as the hardware manufacturer reveals the communication protocol, or at least provides a programming API for the device.

Tuesday morning, July 6, 10:00-13:00

Neural masses on a cortical mesh for co-registered EEG/fMRI prediction

Ingo Bojak, Thom F. Oostendorp, Andrew Reid and Rolf Kötter
Radboud University, Nijmegen, The Netherlands

Integration of data from various imaging modalities to improve spatiotemporal resolution and interpretability is generally seen as the next step forward in neuroimaging. However, neural signal sources differ between modalities and are related non-trivially. Hence fusing data with merely statistical approaches has proven problematic. We demonstrate here that a neural mass model of brain activity situated on a fine-grained cortical mesh can simultaneously predict EEG and fMRI BOLD. The creation of such a forward model with anatomically sound geometry, extensive connectivity, and proper signal expression is an important first step towards the model-based integration of multimodal neuroimages. The intention behind current development is to build an "agnostic" prediction tool, allowing the user to freely change model assumptions like the equations governing the neural mass dynamics or the assumed connectivity. While we show first "proof-of-principle" simulations with the functional computational core, in particular the user and data interfaces are in an inchoate state and feedback from potential users is very welcome.

Tuesday afternoon, July 6, 14:00-17:00

ScalableBrainAtlas.incf.org

Rembrandt Bakker and Rolf Kötter
Radboud University, Nijmegen, The Netherlands

The Scalable Brain Atlas (SBA) is an open source, web-based interactive brain atlas. It displays brain atlas templates (parcellations) for a variety of species and atlas providers. Brain regions can be selected to launch queries to other web-based resources or, websites can use the SBA to visualize sets of brain regions.

With INCF support, the SBA is actively developed into a service-oriented facility. The first public services are the thumbnail service, which produces quasi 3D representations of brain regions in 3D, and the stereotaxic coordinate lookup service, which outputs the name of the brain region at a given voxel location.

The SBA supports a growing list of atlas templates, currently including the Paxinos rhesus monkey atlas, the voxel-based Allen mouse reference atlas, the Waxholm space parcellation and some experimental atlases. Pipeline for importing atlases from a variety of sources (color-coded raster images, NIFTI files, vector-based graphics) have been developed, and we are actively searching for atlas templates to add to our collection.

Plugins are being developed for specific applications, such as the visualization of connectivity data from the CoCoMac database.

Wednesday morning, July 7, 10:00-13:00

Open house

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