Neuroscience 2006, Atlanta, Georgia
Poster and demonstration: Tuesday October 17th 2006, 9.30 am – 12.30 pm

CoCoMac: an integrated brain connectivity database

R Kötter, G Bezgin
Section Neurophysiology & Neuroinformatics Department of Cognitive Neuroscience (126) Radboud University Nijmegen Medical Centre Nijmegen, The Netherlands and C&O Vogt Brain Research Inst. + Inst of Anatomy II, Heinrich Heine University, Düsseldorf, Germany

In this session, we will highlight the potential benefits of interoperability between CoCoMac, an online database of primate brain connectivity (www.cocomac.org) with other databases and neuroinformatics tools.
CoCoMac provides detailed access and references to data specifying the connectivity structure of the brain. The data have been manually collated and curated from peer-reviewed publications employing anatomical tracing and mapping techniques in macaque monkey brains. Consequently, CoCoMac references NCBI's PubMed for registered journal publications providing the abstract and full bibliographic information at a single button click. Conversely, PubMed users can configure the NCBI interface to display available LinkOut to CoCoMac, which adds value by providing supplementary connectivity and mapping information as well as comments and discussion through online retrieval from CoCoMac.
Bidirectional cross-links have also been implemented with BrainInfo (http://braininfo.rprc.washington.edu/), a comprehensive information system on nomenclature, location and fine structure of mammalian brain regions. A single mouse click retrieves corresponding wiring information from CoCoMac. The wiring data from CoCoMac can be visualized on selected brain maps in Catacomb, a java-based neural modeling tool, which is freely available for download from http://askja.bu.edu/catacomb/. As a full-fledged neural simulation program Catacomb has the capability to convert the connectivity data to network models for exploration of the dynamics in real brain networks.
Most recently, we have established interfaces with Caret and the SuMS (Van Essen et al. 2001) to link brain mapping and connectivity data with their spatial representations in monkey and human hemispheres. WebCaret users have direct access to CoCoMac data relevant to the selected brain regions displayed in separate windows. The newly introduced Regional Map (RM) in CoCoMac (Kötter and Wanke 2005) provides a coarse parcellation scheme of cerebral cortex taking into account a combination of microstructural, functional and topographic features. It serves the need to provide an intuitive and rather uncontroversial naming scheme applicable to human and macaque cerebral cortex. The coordinate-independent mapping of RM areas to familiar partitioning schemes (e.g., Brodmann, Bonin & Bailey, Van Essen) in CoCoMac allowed us to generate a spatial representation of RM on a cortical surface template using the Caret software. Thereby we link for the first time the large body of coordinate-independent tracing results to a spatially registered macaque brain and – using existing spatial deformation tools – to the results of neuroimaging studies in humans. These links provide exciting new opportunities to analyze structural and functional neuroimaging data in the context of underlying anatomical connectivity.
.