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Poster and demonstration: Wednesday October 18th 2006, 1.30 pm – 4.30 pm

Topographica: Computational Modeling of Neural Maps

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The goal of the Topographica project is to make large-scale computational modeling of topographic neural maps practical. The project consists of a set of software tools for computational modeling of the structure, development, and function of two-dimensional maps, such as those in the visual cortex. These tools are designed to support:

1. Rapid prototyping of multiple, large maps, with arbitrary feedforward, lateral, and feedback connectivity patterns, and adaptation/self-organization, using firing rate or spiking neuron models;
2. Automatic generation of inputs for self-organization and testing, allowing user control of the statistical environment, based on natural or computer-generated inputs;
3. A graphical user interface for designing networks and experiments, with integrated visualization and analysis tools for understanding the results, as well as for validating models through comparison with experimental results.

The simulator is user programmable in Python, automatically scales to network arrangements and phenomena at different scales, and runs efficiently on desktop workstations. With Topographica, models can be built that focus on structural, functional, or integrative phenomena, either in the visual cortex or in other sensory or motor areas.

Topographica is freely available over the internet at topographica.org. We invite neural map researchers in all fields to begin using Topographica, to help establish a community of researchers who can share code, models, and approaches.

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