RUHR-UNIVERSITÄT BOCHUM

RUB

IGSN - COLLOQUIUM

Wednesday, July 14th • 15:00 (3 pm) FNO – 01 / 117

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Spike Train Metrics and Sensitivity Analysis

We will give an introduction into two useful but quite infrequently used methods in computational modeling and data analysis of neural systems.

"Spike Train Metrics" (STM) provide a mathematical notion of the difference between two or more spike trains. They can measure variability in spike data or characterize the level of variations in responses to stimuli. Some forms of STMs are closely related to correlations but variants have been proposed with different and potentially interesting properties for neuroscience. For example, STMs can be continuously tuned to either reflect firing rates or precise firing times; other variants are more sensitive to bursts instead of single spikes. Distance matrices of several cells can be directly fed into algorithms for cluster analysis or multi-dimensional scaling whereby cooperating groups of cells can be discovered. It is possible to compute STMs and clusters of up to 200 cells in real-time during an on-going experiment, and display the relations between the cells for visual on-line inspection.

"Sensitivity Analysis" deals with the robustness of systems with respect to changes in system parameters. It considers observations (e.g., derived from some metric) of a system given some parameter set and systematically determines how strongly parameter changes effect the system. This leads to a spectrum of sensitivities as well as sensitive and insensitive parameter combinations. Any observable of the system can be used (rates, firing times, tuning widths, etc.) such that the robustness of various observables describing the system can be tested. It is also possible to perform a time-resolved analysis which reveals when parameter changes have large or little effect on the observable over time.

Host:

Christian Igel,
Institute of Neuroinformatics, Ruhr-University Bochum

Guests are welcome !

International Graduate School of Neuroscience
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