

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Deriving functional structure of neuronal networks from spike train data¹ SARAH FELDT, VAUGHN HETRICK, JOSHUA BERKE, MICHAL ZOCHOWSKI, University of Michigan — We present a novel algorithm for the detection of functional clusters in neural data. In contrast to many clustering techniques which convert functional interactions to topological distances to determine groupings, our algorithm directly utilizes the dynamics of the neurons to obtain functional groupings. No prior knowledge of the number of groups is needed, as the algorithm determines statistically significant clusters through a comparison to surrogate data sets. Additionally, we introduce a new synchronization measure and use this measure in the algorithm to observe known groupings in simulated data. We then apply our algorithm to experimental data obtained from the hippocampus of a freely moving mouse and show that it detects known changes in neural states associated with exploration and slow wave sleep. Finally, we show that the new synchronization measure can detect changes which are consistent with known neurophysiological processes involved in memory consolidation.

¹This work was supported through an NSF Graduate Research Fellowship, NIH Grant EB003583, the Whitehall Foundation, and National Institute on Drug Abuse RO1 DA14318.

Sarah Feldt
University of Michigan

Date submitted: 21 Nov 2008

Electronic form version 1.4