1116-37-1906 **Eli Shlizerman*** (`shlizee@uw.edu`), Applied Mathematics, Box 353925, University of Washington, Seattle, WA 98195. *Functional connectomics from data: Constructing probabilistic graphical models for neuronal networks.*

The nervous system of the nematode Caenorhabditis elegans (C. elegans) is comprised of 302 neurons for which the connectivity map is fully resolved. Although the static connectome is available, inference of dominant neural pathways that control sensorimotor responses is challenging since neurons are dynamical objects and interactions within the network are also dynamic. In our study, we construct a Probabilistic Graphical Model (PGM) for the C. elegans connectome that represents the 'effective connectivity' between the neurons (correlations) and takes into account the dynamics. The structure of the PGM is learned using Bayesian methods capable of learning the structure of an undirected graphical model from a collection of time series. The collections are obtained by a systematic excitation of neurons in a recently developed computational dynamical model for the C. elegans that simulates single neural responses and interactions between the neurons. Bayesian posterior inference methods applied to the constructed PGM allow us to extract neural pathways in the connectome of C. elegans responsible for experimentally well characterized movements of the worm such as forward and backward locomotion. (Received September 21, 2015)