

Poster presentation

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Inferring neural connectivity from multiple spike trains

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Recently the temporal coding based on spike timing is one of the hot issues in neuroscience. In the neural network, spike timing depends on the external stimulus and also on the internal network structure. In this study, we propose a method of inferring network connectivity from multiple spike trains. It is based on the phase model description of the spike trains. A continuous phase variable is introduced for each of the spike trains by assigning 2π phase for each of the spike intervals and by the linear interpolation. The relative strength of the mutual dependence allows us to estimate the relative strength of the coupling as well as the type of coupling. We report the results of our test on the coupled neural network model and also on the electronic circuit experiment. When compared with the conventional method based on the cross-correlogram, the proposed method is much more effective in estimating the network connectivity. At the same time, the measurement of the effective coupling allows us to estimate the type of coupling.