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Chronux: a platform for analyzing neural signals

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Neuroscientists are increasingly gathering large time series data sets in the form of multichannel electrophysiological recordings, EEG, MEG, fMRI and optical image time series. The availability of such data has brought with it new challenges for analysis and has created a pressing need for the development of software tools for storing and analyzing neural signals. In fact, while sophisticated methods for analyzing multichannel time series have been developed over the past several decades in statistics and signal processing, the lack of a unified, user-friendly platform that implements these methods is a critical bottleneck in mining large neuroscientific datasets.

Chronux <http://www.chronux.org> is an open source software initiative that aims to fill this void by providing a comprehensive software platform for the analysis of neural signals. It is a collaborative research effort currently based at Cold Spring Harbor Laboratory that has grown out of the work of several groups [1-5]. The current version of Chronux includes a Matlab toolbox for signal processing of neural time series data, several specialized mini-packages for spike sorting, local regression, audio segmentation and other data-analysis tasks typically encountered by a neuroscientist, and a user interface (UI) designed specifically for analysis of EEG data. The eventual goal is to provide domain specific UIs for each experimental modality, along with corresponding data management tools. In particular, we expect Chronux to support analysis of time series data from most of the standard data acquisition modalities in use in neuro-

science. We also expect it to grow in the types of analyses it implements. This talk provides an overview of the platform, emphasizing the spectral analysis toolbox and the EEG UI. We also illustrate the use of Chronux in selected recent publications.

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