Call for Papers: Special Issue on the Statistical Analysis of Neural Data

Topics

Models of Neural Systems: Mechanistic and statistical models are used to understand and explain observed data. Such models can also be used to estimate latent variables (other neural or behavioral signals) that correlate with measured data. For example, state-space models are used to understand how latent variables (states) influence neural and behavioral measurements or to simply explain how and why control systems in the central nervous system operate the way they do. Papers that develop models to estimate latent signals or to explain observed phenomena are encouraged to submit for this topic.

Control of Neural Systems: Control theory is a field that entails the analysis of dynamical systems and the synthesis of controllers that actuate these systems to meet specific objectives (e.g., tracking a signal, rejecting disturbances, stabilizing an unstable system). Control theory has emerged as an important field in neuroscience because it has become possible to more easily manipulate the chemical and electrical patterns in the brain (the dynamical system to be controlled) with drugs that cross the blood brain barrier, electrical stimulation delivered through electrodes implanted into the brain, or via light delivered through optical fibers that excites genetically manipulated neurons. Papers addressing methods and/or applications to study (model) or manipulate neural systems with exogenous inputs using modeling are encouraged to submit for this topic.

Analysis of Neural Systems: Analysis of neurophysiological and behavioral data from neuroscience investigations is a fundamental task in computational and statistical neuroscience. The task can be challenging when the following one or more experimental conditions are present: (i) The dimensionality of the data are scaled up from an order of tens to hundreds or even larger; (ii) The data are either very noisy with a very low signal-to-noise ratio and/or exhibit high variability (across trials or time); (iii) There is an unknown relationship between neural recordings and measured behavior, especially at different temporal scales.

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