Abstract

Extracting Shared Firing Rate Fluctuations from Neural Populations

The spiking of neurons is variable. On nominally identical experimental trials (e.g., repeated presentations of the same stimulus), the spike count within a fixed time window varies. There are at least two sources of variability: i) trial-to-trial variability of the neuron's underlying firing rate, and ii) random processes involved in spike generation (e.g., stochastic vesicle release at synapses). In this talk, I will discuss methods for separating the two sources of variability by leveraging the simultaneous recording of a population of neurons. These methods attempt to extract shared firing rate fluctuations, while assuming that spiking noise is independent across neurons. Applying these methods to neural activity recorded in visual and motor cortices, I will show i) that the underlying firing rates of neurons are more highly correlated than previously believed based on spike count correlations, and ii) how these methods can facilitate the study of neural dynamics and uncover rare events that occur only on a single trial.

Byron Yu, Assistant Professor of Electrical and Computer Engineering, Carnegie Mellon University