

Exploring image representation in the visual cortex using encoding models

In this talk I will discuss the use of high-dimensional regression models to analyze neurophysiological (neuron firing rates) and imaging (e.g. functional MRI) data from the visual cortex. These encoding models are trained to describe and predict the relations between a stimulus - an image or a video - and the response it evokes. Once a model predicts well on novel stimuli, it can be examined to better learn the function of the examined cortical area. Furthermore, these models can be used to identify stimuli from brain activity, a process known as decoding.

I will discuss the estimation of signal-to-noise level in fMRI data, the choice and development of feature sets for less-understood visual areas, and the impact of regularization on the resulting encoding model. I will also emphasize methods for interpretation of models for insight regarding the function of the visual areas.

(These are joint works with Julien Marial, Shinji Nishimoto, Bin Yu, and the Gallant Lab in UC Berkeley).