



JOHNS HOPKINS
BLOOMBERG
SCHOOL of PUBLIC HEALTH

Department of Biostatistics

BIostatISTICS SEMINAR

Modeling Visual Cortex V4 in Naturalistic Conditions with Invariant and Sparse Image Representations

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ABSTRACT

The functional organization of cortex area V4 in the mammalian ventral visual pathway is far from being well understood. V4 plays an important role in the recognition of shapes and objects and in visual attention, but its complexity makes it hard to analyze. In particular, no current model of V4 has shown good predictions for neuronal responses to natural images and there is no consensus on its primary role.

In this talk, we present analysis of electrophysiological data on V4 neuron responses to natural images. We propose a new computational model that achieves comparable prediction for V4 as for V1 neurons. Our model does not rely on any pre-defined image features but only on invariance and sparse coding principles. We interpret our model using sparse principal component analysis and discover two groups of neurons: those selective to texture versus those selective to contours. This supports the thesis that one primary role of V4 is to extract objects from background in the visual field. Moreover, our study also confirms the diversity of V4 neurons. Among those selective to contours, some of them are selective to orientation, others to acute curvature features. (This is joint work with Mairal, Benjamini, Oliver, Willmore, and Gallant).

**The Johns Hopkins Bloomberg School of Public Health
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We request that lunch be eaten before or after seminar and not during the seminar

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