

MAE Seminar Series

Probabilistic inferences in neural circuits: from insects to humans

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Abstract

A wide range of behaviors can be formalized as instances of probabilistic inferences. This includes odor recognition in insects, navigation in rodents, auditory localization in barn owls, decision making in primates and causal reasoning in humans, to name just a few. In all cases, the probabilistic inferences involve products of distributions and marginalization. We will show that, given the type of variability reported in neural responses, products of distributions can be implemented through linear operations over firing rates, while marginalization requires a particular nonlinearity known as quadratic divisive normalization. Both operations are conspicuous in many neural circuits raising the possibility that seemingly unrelated behaviors could in fact rely on very similar neural mechanisms across different species.

Speaker Biography

Alex Pouget is a Professor in the department of Brain and Cognitive Sciences at the University of Rochester. He received in PhD in Biology from the University of California, San Diego and the Salk Institute. His research focuses on probabilistic theories of coding and computation in neural circuits and he is particularly interested in the link between neural activity and behavior. He is also the co-founder of the computational system neuroscience conference.

110 Knox Hall
Thursday, April 16th, 2009
3:30 pm – 4:30 pm

Please contact Dr. Puneet Singla (psingla@eng.buffalo.edu) for additional information