APPLIED MATHEMATICS COLLOQUIUM

Network Motifs, Sufficient Statistics, and a Biological Model of Relational Representation in the Cortex

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Abstract:
We can put an elephant in a room, put a window in a wall, crawl, walk, or run home, all in our mind's eye. These representations support recognition and reasoning. Brains simulate. I will argue that well-known nonlinear properties of dendrites, typically ignored in computational neural models, are a key ingredient in building relational representations. These properties suggest an elementary set of network motifs as sufficient statistics for a generative model. I will focus on vision and the relational hierarchy of part-whole compositions, propose a probabilistic model of scenes, and demonstrate the ability to capture precise geometric relationships by counting local motifs and tilting a Markov distribution via probabilities on these counts.

Monday December 6th 2010
4:30 PM
Building 2, Room 105
Refreshments are available in Building 2, Room 290
(Math Common Room) between 3:30 – 4:30 PM