Department of Biomathematics Seminar Series:
Frontiers in Systems and Integrative Biology

BIOMATH

Neural Codes, Place Fields, and Convexity

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4:00 PM
A2-342 MDCC, Moss Auditorium
Marion Davies Children's Clinic

ABSTRACT:
Navigation is one of the most important functions of the brain. This year, the Nobel Prize in Medicine and Physiology was awarded for the discovery of place cells and grid cells, neurons which form vital pieces of the navigation system. Though the external observed correspondence of these neurons to 2D receptive fields has been carefully recorded and proven, the animal itself navigates the world without access to these maps. An important problem confronted by the brain is to infer what properties of a stimulus space can - in principle - be extracted from the stimulus space. This motivates us to define the neural ring and a related neural ideal, algebraic objects that encode the combinatorial data of a neural code. We find that these objects can be expressed in a "canonical form" that directly translates to a minimal description of the receptive field structure intrinsic to the neural code, and present an algorithm to compute this canonical form. We also find that topological information about the stimulus space can be directly extracted from the neural ideal.

Host: Ning Li, Ph.D. and Mary Sehl, M.D., Ph.D.

To receive e-mail seminar notices, contact David Tomita (dtomita@biomath.ucla.edu)