



The Institute for Neural Computation

ROCKWOOD MEMORIAL LECTURE



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Can connectomics help us understand neural computation? Insights from the fly visual system

When: Monday, April 1, 2013 - 4:00 p.m.

Location: San Diego Supercomputer Center Auditorium

Host: Terry Sejnowski

Abstract:

Animal behavior arises from computations in neuronal circuits, but our understanding of these computations has been frustrated by the lack of detailed synaptic connection maps, or connectomes. For example, despite intensive investigations over half a century, the neuronal implementation of local motion detection in the insect visual system remains elusive. To address this problem, we developed a semi-automated pipeline using serial-section electron microscopy to reconstruct a connectome, comprising 377 neurons and 14,798 synapses, within the *Drosophila* optic medulla. By matching reconstructed neurons to examples from light microscopy, we assigned neurons to cell types and assembled a connectome of the medulla's repeating module. Within this module, we identified cell types constituting a motion detection circuit and showed that the connections onto individual motion sensitive neurons in this circuit were consistent with their direction selectivity. Our results identify cellular targets for future functional investigations, and demonstrate that connectomes can provide key insights into neuronal computations.

2013 Rockwood Memorial Lecture

INC presents the H. Paul Rockwood Memorial Lectureship held annually. The Rockwood Memorial Lectureship Fund was gifted to the Institute by Mr. and Mrs. Jerome Rockwood in memory of their late son's interest, studies, and work in the neural computation field. The Rockwood Memorial Lectures are endowed by Mr. and Mrs. Jerome Rockwood in memory of their late son, Paul, who received a B.S. in Computer Science from UCSD in 1980 and then obtained a second degree B.A. in Psychology in 1981. In 1983 he started a company, Integral Solutions, to develop a universal language translation, but died tragically in a mountaineering accident before he could fulfill his promise.

