FORDHAM UNIVERSITY
THE JESUIT UNIVERSITY OF NEW YORK

Department of Computer and Information Science

Fall 2017 CIS Faculty Research Talk Series

Research in Computational Neuroscience

Speaker: Prof. Daniel D. Leeds, Undergraduate Program Director

Fordham University

Date: December 6, 2017

Time: 12:00 pm – 1:00 pm

Venue: John Mulcahy Hall (JMH) 342

Abstract: The nature of visual properties used in cortical perception is subject to considerable ongoing study. Features of intermediate complexity are particularly uncertain. Computer vision models including the Scale Invariant Feature Transform (SIFT) and Convolutional Neural Networks (CNN), however, have proven to be quite effective in modeling human vision and have performed with great accuracy on image classification tasks. Study of representations embedded in SIFT and encoded within layers of CNN models may suggest selectivities in the similarly hierarchical brain. In the present talk, I will discuss my recent work applying a popular CNN to diverse stimulus sets and to associated cortical responses. Dissecting the CNN into model layers and computational "neuron" units, we identify a subset of redundant units most strongly accounting for similarities in cortical and CNN responses to visual inputs. Through deconvolution and clustering within CNNs, we identify classes of preferred visual properties --- sometimes intuitive shapes, patterns, and holistic objects; and sometimes patterns less accessible to our common sense. Our findings suggest computational and representational insights into cortical vision can be obtained from targeted study of modern computer vision models.

Speaker's Biography: Dr. Daniel D. Leeds is an assistant professor of Computer and Information Science at Fordham University. He is a member of the Executive Committee for the Integrative Neuroscience program and director of the Computational Neuroscience Laboratory at Fordham. Dr. Leeds' research focuses on computational models of biological perception and trends in impaired cognition from cortical injury and aging. He develops and employs techniques in machine learning, computer vision, and signal processing. Dr. Leeds received his PhD in Neural Computation and a Masters of Science in Robotics at Carnegie Mellon University. He received a Masters of Engineering and a Bachelors of Science in Electrical Engineering and Computer Science from the Massachusetts Institute of Technology.

Refreshments will be served!