IEM SEMINAR SERIES

THURSDAY
August 25th, 2016

Image and Decoding Human Brain Activity During Dynamic Natural Vision

Institute for Engineering in Medicine

UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

Dr. Zhongming Liu
Assistant Professor of Electrical and Computer Engineering and Biomedical Engineering
Purdue University

FREE event, no registration required.

Pizza lunch will be provided from 12:15 pm

12:30PM - 1:30PM
Jackson Hall
Room 2-137

For additional information on Dr. Zhongming's presentation please contact:
scot0353@umn.edu

The Institute for Engineering in Medicine (IEM) is pleased to announce a seminar by Dr. Zhongming Liu, "Imaging and decoding human brain activity during dynamic natural vision."

How does the brain represent visual information from the outside world? In my lab, we approach this question with a deep neural network that mimics neuronal circuitry and coding, and learns to solve computer vision tasks. Using this network as a computational model of the visual cortex, we develop novel encoding and decoding models to describe the bi-directional relationships between visual input and cortical activity measured with functional magnetic resonance imaging. Testing these models with imaging data from humans watching natural movies, we show that the encoding model can predict cortical responses and retrieve visual representations at individual brain locations, and that the decoding model can decipher the measured cortical activity to reconstruct the visual and semantic experiences. Both the encoding and decoding models utilize cortical representations of hierarchical, invariant, and nonlinear visual features. Being self-contained, efficient, and generalizable, these models constitute a computational workbench for high-throughput investigation of all stages of visual processing. We also anticipate that the general strategy for neural encoding and decoding via deep-learning models will be applicable to other sensory or cognitive experiences, e.g. speech, imagery, memories and dreams.

Zhongming Liu is an assistant professor in the Weldon School of Biomedical Engineering, and the School of Electrical and Computer Engineering at Purdue University. He received his B.S. and M.S. degrees in electrical engineering from Zhejiang University in China, and received his Ph.D. degree in biomedical engineering from the University of Minnesota in USA. He further received postdoctoral training in magnetic resonance imaging and neuroscience at the National Institute of Neurological Disorders and Stroke. Currently, his research lab is primarily focused on developing magnetic resonance imaging methods to map and decode brain activity and connectivity in humans and small animals.

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