



Machine Science and the Automated Uncovering of Hidden Variables in Dynamical Systems

Dr. Daniel Ly

Postdoctoral Scholar, Department of Psychology
Stanford University



Wednesday March 19th, 2014

8:30-9:30am

Biotechnology Building BI 2221 (ITC Conference Room)

Key breakthroughs in scientific discovery often occur by inferring the existence of previously unobserved processes, but these breakthrough have been traditionally driven by human insight and thus have been difficult to automate. In this talk, I will present a computational approach to automatically discover the existence and dynamics of previously unmeasured variables in nonlinear dynamical systems from time-series data. By searching for simple formulations of predictive models from experimental data, we can infer unobserved drivers of various systems in the domains of population dynamics, neuron dynamics, chemical oscillators, and chaotic systems. Our results demonstrate how a principle of simplicity can automatically reveal lurking state variables that correspond to physical quantities without any prior domain knowledge or direct observations.

Dr. Ly received the BSc degree in Engineering Science and the MSc degree in Computer Engineering from the University of Toronto in 2008 and 2009, respectively, and the PhD degree in Mechanical Engineering from Cornell University in 2013. He is currently a postdoctoral scholar with the Department of Psychology at Stanford University. His research interests include computational approaches for discovering underlying structure in complex natural and engineered systems, and their implications towards the understanding of cognitive processes.

For more information, contact Hiroki Sayama (sayama@binghamton.edu)

<http://coco.binghamton.edu/>