Yue M. Lu

Associate Professor
John A. Paulson School of Engineering and Applied Sciences
Harvard University

"Signal and Information Processing in the Age of Massive Data: Exploiting the Blessings of Dimensionality"

Wednesday, September 19, 2018
2:30 – 3:30 p.m. in POTR 234 Fu Room

Abstract

Extracting meaningful information from the massive datasets being compiled by our society presents challenges and opportunities to signal and information processing research. On the one hand, many classical methods, and the assumptions they are based on, are simply not designed to handle the explosive growth of the dimensionality of the modern datasets. On the other hand, the increasing dimensionality offers many benefits: in particular, the very high-dimensional settings allow one to apply powerful asymptotic methods from probability theory and statistical physics to obtain precise characterizations that would otherwise be too complicated in moderate dimensions.

I will mention recent work in my group on exploiting such blessings of dimensionality via sharp asymptotic methods. In particular, I will show (1) the exact characterization of a widely-used spectral method for nonconvex statistical estimation; (2) the fundamental limits of solving the phase retrieval problem via linear programming; and (3) how to use scaling and mean-field limits to analyze nonconvex optimization algorithms for high-dimensional inference and learning. In these problems, asymptotic methods not only clarify some of the fascinating phenomena that emerge with high-dimensional data, they also lead to optimal designs that significantly outperform commonly used heuristic choices.

Biography

Yue M. Lu attended the University of Illinois at Urbana-Champaign, where he received the M.Sc. degree in mathematics and the Ph.D. degree in electrical engineering, both in 2007. After working as a postdoctoral researcher at the Audiovisual Communications Laboratory at Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland, he joined Harvard University, where he is currently an Associate Professor of Electrical Engineering at the John A. Paulson School of Engineering and Applied Sciences.

He received the Most Innovative Paper Award of IEEE International Conference on Image Processing (ICIP) in 2006, the Best Student Paper Award of IEEE ICIP in 2007, and the Best Student Presentation Award at the 31st SIAM SEAS Conference in 2007. Student papers supervised and coauthored by him won the Best Student Paper Award of IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) in 2011, the Best Student Paper Award of IEEE Global Conference on Signal and Information Processing (GlobalSIP) in 2014, and the Student Paper Award (First Prize) of the IEEE CAMSAP Workshop in 2017. He is an Associate Editor of the IEEE Transactions on Signal Processing and a Member of the IEEE Signal Processing Theory and Methods Technical Committee. In the past, he has also served as an Associate Editor of the IEEE Transactions on Image Processing, and a Member of the IEEE Image, Video, and Multidimensional Signal Processing Technical Committee. He is a recipient of the ECE Illinois Young Alumni Achievement Award.

Host: Assistant Professor Stanley Chan, stanchan@purdue.edu, 49-60230