

SenSIP Graduate Student Seminar Series

Stochastic Frank-Wolfe algorithms for high-dimensional optimization: with applications to online learning and distributed optimization

Presenter: Hoi To Wai, PhD Candidate

April 8 (Friday), 2016, 11:00 AM / Room: GWC 487

Abstract

This seminar presents new analytical results for stochastic variants of the Frank-Wolfe (FW) algorithm, which has become popular recently for constrained optimization problems. Compared to the much studied proximal/projected gradient methods, FW algorithm is an appealing option for high-dimensional problems due to its projection-free nature. Here, our first contribution is to study sufficient conditions under which the convergence rates of stochastic FW algorithms can be accelerated to $O(1/t)$ from the standard $O(1/\sqrt{t})$. Such convergence rate is often observed in numerical simulations and our work provides the first theoretical justification. To illustrate our findings, this talk describes two applications — i) we propose online learning algorithms for sparse learning and matrix completion problems. For these problems, we show that the algorithm achieves the information theoretic lower bound of the corresponding stochastic optimization, while the computational complexity is much lower than existing methods; ii) we also develop communication-efficient decentralized algorithms for sparse learning problems. With the framework of stochastic FW algorithms, we propose and analyze a decentralized FW (DeFW) algorithm with low complexity cost. This is a joint work done with Jean Lafond (Telecom-Paristech) and Eric Moulines (Ecole Polytechnique).



Biography:

Hoi-to Wai has been a PhD student at ASU since Spring 2015, where he is working with Prof. Anna Scaglione. Prior to ASU, he has studied at UC Davis from Fall 2013 to Fall 2014 as a PhD student and received his B. Eng. (with first class Honor) and M. Phil. from The Chinese University of Hong Kong. In summer 2015, he was a visiting PhD student at Telecom Paristech, where he was hosted by Prof. Eric Moulines. His research interests lie in the intersection of machine learning, signal processing and optimization, with a recent focus applications to networked systems including social networks and smart grid.

Refreshments

Upcoming Student Seminars:

Henry Braun, TBA, 04/15

Weina Wang, *The Value of Privacy: Strategic Data Subjects, Incentive Mechanisms and Fundamental Limits*, 04/29

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