Saeid Hajizadeh

CITIZENSHIP STATUS: U. S. Permanent Resident

CONTACT INFORMATION:
851 S. Morgan St.
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University of Illinois at Chicago
Chicago, IL 60607
Google Scholar : Google Scholar

RESEARCH INTERESTS: Nonconvex Minimax Optimization, Nonsmooth Optimization, Large-Scale Optimization, Machine Learning, and Application of Variational Analysis in Optimization

EDUCATION

The University of Illinois at Chicago, Chicago, IL

PhD, Mathematical Computer Science 2017-2023
Advised by: Haihao (Sean) Lu and Lev Reyzin

The University of Illinois at Chicago, Chicago, IL

Masters of Science , Electrical and Computer Engineering, 2016

Ferdowsi University of Mashhad, Mashhad, Iran

B.Sc., Electrical Engineering, 2011

- Thesis Topic: *Broadcast Channels in Network Information Theory*
- Advisor: Ghosheh Abed Hodtani

RESEARCH

The University of Chicago, Chicago, IL

Large-scale minimax optimization, 2020-Present

This is a multi-folded project with my advisor, Haihao Lu, in which we try to understand the reach of first-order methods in solving nonconvex-nonconcave minimax problems.

- In the most recent result we have submitted, we proved the convergence of Extra-Gradient Methods to a stationary point of nonconvex-nonconcave objective functions when there is strong interaction between the two adversaries, i.e. the two variables the objective is being minimaxed upon.
- In the project I recently started, we are looking at the question of how one can use first-order methods to efficiently solve linear programming when the scale is huge. In these problems, simplex and interior point method, which are considered in the class of second-order methods, admit storage and computational issues in very large scale. First order primal-dual methods, for instance, admit matrix-vector product as their worst computational block which is efficient even in huge scales. On the other hand, first-order methods are easily distributed across various machines while classical LP methods solve linear systems of equations which are challenging to distribute across various systems and GPUs.
- The other project we are working with is to show convergence of first-order methods for nonconvex-nonconcave minimax problems in the presence of closed convex sets as constraints. This problem can be described as a nonsmooth nonconvex-nonconcave minimax optimization.

The University of Illinois at Chicago, Chicago, IL

Information Theoretical limits of Communication on two-way channels, 2013-2015

Ferdowsi University of Mashhad, Mashhad, Iran

Undergraduate Research Student, Information Theory, 2010-2012

COURSEWORK

- Fundamentals of Deep Learning
- Numerical Optimization
- Convex and Variational Analysis (self-taught; here are my notes)
- Real Analysis
- Probability Theory
- Point-set Topology
- Market Microstructure and Electronic Trading
- Quantitative Methods in Finance
- Ordinary Differential Equations
- Advanced Statistical Theory
- Network Information Theory
- Stochastic Process
- Digital Signal Processing II
- Advanced Digital Communications
- Detection and Estimation Theory

SELF-STUDY COURSEWORK

- Statistical Learning
  - Linear Regression Models with Some Examples in Finance
  - Logistic Regression, Linear Discriminant Analysis (LDA), Quadratic Discriminant Analysis (QDA), and K-Nearest Neighbor (KNN)
  - Non-linear Learning Methods
- Advanced Linear Algebra
  - Linear Algebra brain-teasers I solved

HONORS AND AWARDS

Exceptional Undergraduate researcher, Ferdowsi University of Mashhad

PUBLICATIONS

S. Hajizadeh, Haihao Lu, and Benjamin Grimmer, ***Laste-iterate linear Convergence of Extra-Gradient Methods for Nonconvex-Nonconcave Minimax Problems***, arXiv:2201.06167v1

S. Berenjian, S. Hajizadeh, R. Ebrahimi, ***An Incentive Security Model to Provide Fairness for Peer-to-Peer Networks***, *IEEE Conference on Applications, Information and Network Security*, 19-21 Nov. 2019, Penang, Malaysia.

M. Monemizadeh, H. Fehri, G. Abed Hodtani, S. Hajizadeh ***Capacity Bounds and High-SNR Capacity of the Additive Exponential Noise Channel With Additive Exponential Interference***, *Iranian Journal of Electrical and Electronic Engineering*, Aug. 2019.

S. Hajizadeh, N. Devroye ***Dependence Balance Outer Bounds for the Discrete Memoryless Two-way Multiple Access Broadcast Channel***, 52^{nd} *Annual Allerton Conference on Communication, Control, and Computing*, Monticello, IL, Oct. 2014.

S. Hajizadeh, M. Monemizadeh, and E. Bahmani ***State-dependendent Z Channels***, 48^{th} *Annual Conference on Information Sciences and Systems (CISS)*, Princeton University, March 19-21, 2014. More complete version available at ArXiv.

S. Hajizadeh, G. A. Hodtani ***Three-receiver Broadcast Channels with Side Information***, *IEEE Int. Symp. on Inf. Theory*, Boston, MA, July 2012.

S. Hajizadeh, G. A. Hodtani ***Asymmetric Broadcast Channels***, 50^{th} *annual Allerton Conference on Communications, Control, and Computing*, Monticello, IL, Oct. 2012.

S. Hajizadeh, M. Monemizadeh, G. A. Hodtani ***A Coding Theorem for the Discrete Mem- oryless Compound Multiple Access Channels with Common Message and Generalized Feedback***, 50^{th} *annual Allerton Conference on Communications, Control, and Computing*, Monticello, IL, Oct. 2012.

M. Momenizadeh, S. Hajizadeh, G. A. Hodtani S. A. Seyedin ***Compound Multiple Access channel with Common Message and Intersymbol Interference***, *International Symposium on Telecommunications (IST)*, Tehran, Iran, 2012.

M. Momenizadeh, S. Hajizadeh, G. A. Hodtani ***Capacity Bounds for Exponentially Dirty Paper***, submitted to *IEEE Wireless Communications Letters*, available online at ArXiv.

S. Hajizadeh ***Broadcast Channels***, *B.Sc. Thesis*, September 2011, Ferdowsi University of Mashhad, Mashhad, Iran.

COMPUTER SKILLS

- Julia
- Python
- Matlab
- R
- C++ (less proficient)

HOBBIES AND PASTIME

- Listening to the U.S. Supreme Court Oral Arguments
- Reading about Antitrust Law
- Reading History (of U.S. Supreme Court and Japan, in particular)
- Listening to Podcasts (“The Zach Lowe” and “We The People” are my favorites)
- Watching Basketball
- Camping
- Cooking