Curriculum Vitae

Contact Information

Xingguo Li

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Research Interest

Nonconvex Optimization, Machine Learning, Deep Learning, and their applications

Education

Ph.D. in Electrical and Computer Engineering — Aug 2013 - Jul 2018
University of Minnesota Twin Cities
Mentor: Professor Jarvis Haupt

M.S. in Applied and Computational Mathematics — Aug 2011 - Jun 2013
University of Minnesota Duluth

B.E. in Communications Engineering — Sep 2006 - Jun 2010
Beijing University of Posts and Telecommunications

Academic Employment

Postdoctoral Research Associate — Sep 2018 – Aug 2019
Department of Computer Science, Princeton University
Supervisor: Professor Sanjeev Arora

Visiting Graduate Scholar — Mar 2017 – Apr 2018
School of Industrial & Systems Engineering, Georgia Institute of Technology
Supervisor: Professor Tuo Zhao

Graduate Research Assistant — Aug 2013 – Aug 2017
Department of Electrical and Computer Engineering, University of Minnesota Twin Cities
Supervisor: Professor Jarvis Haupt

Visiting Graduate Scholar — May 2016 – Aug 2016
Department of Computer Science, Johns Hopkins University
Supervisor: Professor Raman Arora

Research Associate I — Aug 2010 – Jun 2011
Robotics Institute, School of Computer Science, Carnegie Mellon University
Supervisor: Professor Fernando De la Torre and Professor Alexander G. Hauptmann

Research Intern — Jul 2009 – Jun 2010
CRIPC, National Laboratory of Pattern Recognition, Chinese Academy of Sciences
Supervisor: Professor Kaiqi Huang and Professor Tieniu Tan

Journal Publications

[1] **X. Li**, T. Zhao, R. Arora, H. Liu, and M. Hong. On Faster Convergence of Cyclic Block Coordinate Descent-type Methods for Strongly Convex Minimization. *Journal of Machine Learning Research*, vol. 18, no. 184, pp. 1 – 24, 2018.

[2] **X. Li** and J. Haupt. Identifying Outliers in Large Matrices via Randomized Adaptive Compressive Sampling. *IEEE Transactions on Signal Processing*, vol. 63, no. 7, pp.

1792 – 1807, April 2015.

[3] **X. Li***, T. Zhao*, L. Wang, X. Yuan, and H. Liu (*Co-first author). An `R` Package `flare` for High Dimensional Linear Regression and Precision Matrix Estimation. *Journal of Machine Learning Research*, vol. 16, pp. 553 – 557, March 2015.

Conference Publications

[4] W. Liu, B. Dai, **X. Li**, Z. Liu, J. Rehg, and L. Song. Towards Black-box Iterative Machine Teaching. *Proceedings of the 35rd International Conference on Machine Learning (ICML)*, 2018.

[5] S. Liu, **X. Li**, P. Chen, J. Haupt, L. Amini. Zeroth-Order Stochastic Projected Gradient Descent for Nonconvex Optimization. *IEEE Global Conference on Signal and Information Processing (GlobalSIP)*, 2018.

[6] **X. Li**, J. Ren, S. Rambhatla, Y. Xu, and J. Haupt. Robust PCA via Dictionary Based Outlier Pursuit. *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2018.

[7] **X. Li**, J. Haupt, and D. Woodruff. Near Optimal Sketching of Low-Rank Tensor Regression. *In Advances in Neural Information Processing Systems (NIPS)*, 2017.

[8] **X. Li**, L. Yang, J. Ge, J. Haupt, T. Zhang, and T. Zhao. On Quadratic Convergence of DC Proximal Newton Algorithm in Nonconvex Sparse Learning. *In Advances in Neural Information Processing Systems (NIPS)*, 2017.

[9] W. Liu, Y. Zhang, **X. Li**, Z. Yu, B. Dai, T. Zhao, and L. Song. Deep Hyperspherical Learning. *In Advances in Neural Information Processing Systems (NIPS)*, 2017.

[10]S. Rambhatla, **X. Li**, and J. Haupt. Target Based Hyperspectral Demixing via Generalized Robust PCA. *Asilomar Conference on Signals, Systems, and Computers (Asilomar)*, 2017. **Best Student Paper Award Finalist**

[11]**X. Li** and J. Haupt. Robust Outlier Identification for Noisy Data via Randomized Adaptive Compressive Sampling. *The Signal Processing with Adaptive Sparse Structured Representations Workshop (SPARS)*, 2017.

[12]**X. Li** and J. Haupt. Robust Low-Complexity Methods for Matrix Column Outlier Identification. *IEEE International Workshop on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP)*, 2017.

[13]J. Ren, **X. Li**, and J. Haupt. Communication-Efficient Distributed Optimization for Sparse Learning via Two-Way Truncation. *IEEE International Workshop on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP)*, 2017.

[14]S. Rambhatla, **X. Li**, and J. Haupt. A Dictionary Based Generalization of Robust PCA. *IEEE Global Conference on Signal and Information Processing (GlobalSIP)*, 2016.

[15]J. Ren, **X. Li** and J. Haupt. Robust PCA via Tensor Outlier Pursuit. *Asilomar Conference on Signals, Systems, and Computers (Asilomar)*, 2016.

[16]**X. Li** and J. Haupt. A Refined Analysis for the Sample Complexity of Adaptive Compressive Outlier Sensing. *IEEE Workshop on Statistical Signal Processing (SSP)*, 2016.

[17]**X. Li**, T. Zhao, R. Arora, H. Liu, and J. Haupt. Stochastic Variance Reduced Optimization for Nonconvex Sparse Learning. *Proceedings of the 33rd International Conference*

on Machine Learning (ICML), 2016.

[18]**X. Li***, T. Zhao*, R. Arora, H. Liu, and M. Hong (*Co-first author). An Improved Convergence Analysis of Cyclic Block Coordinate Gradient Descent Methods for Strongly Convex Minimization. *Proceedings of the 19th International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2016.

[19]**X. Li** and J. Haupt. Locating Salient Group-Structured Image Features via Adaptive Compressive Sensing. *IEEE Global Conference on Signal and Information Processing (GlobalSIP)*, 2015. **Best Student Paper Award**.

[20]**X. Li** and J. Haupt. Outlier Identification via Randomized Adaptive Compressive Sampling. *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pp. 3302 – 3306, 2015.

[21]**X. Li**, T. Wang, J. Chen, J. Chen, Z. Qian, J. K. Pollard, S. Liu, and J. Yu. Customer service enhancement using passive RFID. *IEEE International Conference on Communications Technology Applications*, Session 1, pp. 5 – 9, 2009.

[22]**X. Li**, T. Wang, G. Fan, X. Wang, S. Liu, and J. Yu. Autonomic Customer Service System. *IEEE Global Mobile Conference*, pp. 293 – 297, 2009.

[23]F. Xie, S. He, **X. Li**, J. Du, J. Yang, Y. Fu, Y. Chen, J. Wang, Z. Liu and Q. Zhu. To Create Neuro-Controlled Game Opponent from UCT-Created Data. *First ACM/SIGEVO Summit on Genetic and Evolutionary Computation*, pp. 1013 – 1016, 2009.

PREPRINTS

[24]**X. Li**, J. Lu, Z, Wang, J. Haupt, and T. Zhao. On Tighter Generalization Bound for Deep Neural Networks: CNNs, ResNets, and Beyond. *arXiv:*1806.05159.

[25]**X. Li**, H. Jiang, J. Ge, M. Wang, J. Haupt, M. Hong, and T. Zhao. Boosting Pathwise Coordinate Optimization in High Dimensions: Sequential Screening and Subsampled Prox-Newton Subroutine.

[26]S. Rambhatla, **X. Li**, and J. Haupt. NOODL: Provable Online Learning for Matrix Factorization and Sparse Coding. (submitted)

[27]Z. Chen, **X. Li**, L. Yang, J. Haupt, and T. Zhao. On Landscape of Lagrangian Functions and Stochastic Search for Constrained Nonconvex Optimization. *IEEE Transactions on Automatic Control*. (submitted)

[28]**X. Li** and J. Haupt. Robust Low-Complexity Randomized Methods for Locating Outliers in Large Matrices. *IEEE Transactions on Signal Processing*. (revision)

[29]**X. Li**, Y. Xu, T. Zhao, and H. Liu. Statistical and Computational Tradeoffs of Regularized Dantzig-type Estimator. *Electronic Journal of Statistics*. (revision)

[30]**X. Li**, Z. Wang, J. Lu, J. Haupt, R. Arora, H. Liu, and T. Zhao. Symmetry, Saddle Points, and Global Geometry of Nonconvex Matrix Factorization. *arXiv:*1612.09296. *IEEE Transactions on Information Theory*. (revision)

[31]**X. Li**, T. Zhao, R. Arora, H. Liu, and J. Haupt. Nonconvex Sparse Learning via Stochastic Optimization with Progressive Variance Reduction. *arXiv:*1605.02711. *IEEE Transactions on Information Theory*. (revision)

[32]**X. Li**, H. Jiang, J. Haupt, R. Arora, H. Liu, M. Hong, and T. Zhao. On Fast Convergence

of Proximal Algorithms for SQRT-Lasso Optimization: Don't Worry About its Nonsmooth Loss Function. *Journal of Machine Learning Research*. (submitted)

[33]**X. Li***, J. Ge*, M. Wang, T. Zhang, H. Liu, and T. Zhao. The "PICASSO" Package for High Dimensional Nonconvex Sparse Learning in R.
2016 ASA Best Student Paper Award on Statistical Computing.

[34]**X. Li** and J. Haupt. Sketching Dictionary based Robust PCA in Large Matrices. *(submitted)*

R Packages Developed

"HUGE": High-dimensional Undirected Graph Estimation. T. Zhao, **X. Li**, H. Liu, K. Roeder, J. Lafferty, and L. Wasserman.

"PICASSO": Pathwise Calibrated Sparse Shooting Algorithm. **X. Li**, J. Ge, M. Wang, H. Liu, T. Zhang, and T. Zhao.

"FLARE": Family of Lasso Regression. **X. Li**, T. Zhao, L. Wang, X. Yuan, and H. Liu.

"CAMEL": Calibrated Machine Learning. **X. Li**, T. Zhao, and H. Liu.

"SAM": Sparse Additive Modeling. T. Zhao, **X. Li**, H. Liu, and K. Roeder.

Honors and Awards

IBM Herman Goldstine Memorial Postdoctoral Fellowship (Declined) 2018
Doctoral Dissertation Fellowship, UMN 2017
Best Student Paper Award Finalist, Asilomar 2017
ASA Best Student Paper Award on Statistical Computing 2016
Best Student Paper Award, GlobalSIP 2015
Google Summer of Code 2014 – 2016
Outstanding Graduate Award, Dep. of Math. and Stat., UMN Duluth 2013
Poster Session Winner, Midwest Statistical Research Colloquium, UW Madison 2013
Summer Research Fellowship, UMN Duluth 2012
Champion in Detection & Runner-up in Classification: Pascal VOC Challenge 2010
National Scholarship, Ministry of Education of China 2009
Gold Medal, "Challenge Cup" College Student Competition, Beijing 2009
Honorable Mention, Mathematical Contest in Modeling, USA 2009
Silver Medal, National Undergraduate Mathematical Contest in Modeling, China 2009
First Class Scholarship, BUPT 2007 – 2009
Travel Awards: NIPS 2017, ICML 2016, Machine Learning Summer School 2016, IEEE Signal Processing Society GlobalSIP 2015, Swenson College of Science and Engineering and Graduate Office Student Travel Awards of UMN Duluth 2013

Talks

"Machine Learning via Overparametrization: From Matrix Factorization to Deep Neural Networks"
— Statistics Seminar, ISYE, Georgia Institute of Technology, USA Feb 2018

"Symmetry, Saddle Points, and Global Geometry of Nonconvex Matrix Factorization"
— Information Theory and Applications Workshop, San Diego, USA Feb 2018
— INFORMS Annual Meeting, Houston, USA Oct 2017
— Statistical Learning and Data Science Session, JSM, Baltimore, USA Aug 2017

"Robust Outlier Identification for Noisy Data via Randomized Adap. Comp. Sampling"
— SPARS Workshop, Lisbon, Portugal Jun 2017

"The PICASSO Package for High Dimensional Nonconvex Sparse Learning in R"
— Statistical Computing Student Awards Session, JSM, Chicago, USA Aug 2016

"Locating Outliers in Large Matrices with Adaptive Compressive Sampling"
— Vision and Learning Seminar (VALSE), China (Invited) Sep 2016
— Xerox Research Centre Europe, Grenoble, France (Invited) Jun 2016

"Stochastic Variance Reduced Optimization for Nonconvex Sparse Learning"
— Machine Learning Seminar, John Hopkins University, USA (Invited) Jul 2016
— ICML, Optimization Session, New York, USA Jun 2016

"Locating Salient Group-Structured Image Features via Adap. Comp. Sampling"
— GlobalSIP, Orlando, FL, USA Dec 2015

"Identifying Outliers in Large Matrices via Randomized Adap. Comp. Sampling"
— Digital Tech. Center, University of Minnesota Twin Cities, USA (Invited) Dec 2014

Teaching Experience

Graduate Teaching Assistant Sep 2011 – May 2012
Department of Mathematics and Statistics, UMN Duluth

Conference Services

Volunteer: ICML, 2016
Session Chair: "Advanced Compressive Sensing Methods" and "Efficient and Robust Signal Modeling", GlobalSIP, 2015
Session Chair: "Regularization and Generalization in Learning", ITA workshop, 2018

Reviewing Activities

IEEE Transactions on Information Theory
IEEE Transactions on Pattern Analysis and Machine Intelligence
IEEE Transactions on Signal Processing
IEEE Transactions on Neural Networks and Learning Systems
IEEE Signal Processing Letters
Journal of Selected Topics in Signal Processing
Journal of Time Series Analysis
EURASIP Journal on Advances in Signal Processing
ICML2018, SODA 2018, NIPS 2016 – 2018, AISTATS 2016 – 2018, SSP 2016, ICASSP 2015 – 2018, GlobalSIP 2015, CVPR 2011

Professional Memberships

American Statistical Association Student Member, since 2016
IEEE Signal Processing Society Student Member, since 2015
IEEE Student Member, since 2014
American Mathematical Society Student Member, 2011 – 2013

Programming Skills

R, MATLAB, C, C++, Python, JAVA.

Working Languages

Chinese, English, Korean.