Curriculum Vitae

CONTACT
INFORMATION

Xingguo Li

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RESEARCH
INTEREST

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

WORK
EXPERIENCE

Postdoctoral Research Associate   Sep 2018 – Present
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
Host: Professor Tuo Zhao

Visiting Researcher   Aug 2016 – Sep 2016
IBM Research Almaden
Host: Professor David P. Woodruff

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

Graduate Research Assistant   Sep 2013 – Jul 2018
Department of Electrical and Computer Engineering, University of Minnesota Twin Cities
Supervisor: Professor Jarvis Haupt

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

EDUCATION

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

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

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

JOURNAL
PUBLICATIONS

[1] **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. *IEEE Transactions on Information Theory*, vol. 65, no. 6, pp. 3489 − 3514, June 2019

[2] **X. Li***, J. Ge*, H. Jiang, H. Liu, T. Zhang, M. Wang, and T. Zhao. Picasso: A Sparse

Learning Library for High Dimensional Data Analysis in R and Python. *Journal of Machine Learning Research*, vol. 20, pp. $1 - 5$, March 2019
American Statistical Association Best Student Paper Award on Statistical Computing, 2016

[3] **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. $1 - 24$, April 2018.

[4] **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.

[5] **X. Li***, T. Zhao*, L. Wang, X. Yuan, and H. Liu. 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

[6] **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. *In 35th Conference on Uncertainty in Artificial Intelligence (UAI)*, 2019

[7] Z. Chen, **X. Li**, L. Yang, J. Haupt, and T. Zhao. On Constrained Nonconvex Stochastic Optimization: A Case Study for Generalized Eigenvalue Decomposition. *Proceedings of the 22nd International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2019

[8] S. Rambhatla, **X. Li**, and J. Haupt. Provable Online Dictionary Learning and Sparse Coding. *The 7th International Conference on Learning Representations (ICLR)*, 2019

[9] 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

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

[11] **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

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

[13] **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

[14] 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

[15] 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**

[16] S. Rambhatla, **X. Li**, and J. Haupt. A Dictionary Based Generalization of Robust PCA.

IEEE Global Conference on Signal and Information Processing (GlobalSIP), 2016

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

[18]**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

[19]**X. Li***, T. Zhao*, R. Arora, H. Liu, and M. Hong. 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

[20]**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**

[21]**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

[22]**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

[23]**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

[24]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

WORKSHOP REPORTS

[25]**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

[26]**X. Li**, Z. Chen, L. Yang, J. Haupt, and T. Zhao. Online Generalized Eigenvalue Decomposition: Primal Dual Geometry and Inverse-Free Stochastic Optimization. *10th NIPS Workshop on Optimization for Machine Learning*, 2017

[27]**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

[28]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

[29]**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

PREPRINTS

[30]**X. Li**, Y. Zhang, and S. Arora. On Robustness and Convergence Analysis of Deep Adversarial Training. (in preparation)

[31] Y. Zhang, **X. Li**, and S. Arora. Theoretical Analysis of Word Alignment. (in preparation)

[32] X. Chen, K. Xu, **X. Li**, and S. Liu. ZO-AdaMM: Zeroth-Order Adaptive Momentum Method for Black-Box Optimization. (submitted)

[33] S. Rambhatla, **X. Li**, and J. Haupt. Provable Online CP/PARAFAC Decomposition of a Structured Tensor via Dictionary Learning. (submitted)

[34] S. Rambhatla, **X. Li**, J. Ren, and J. Haupt. A Dictionary-Based Generalization of Robust PCA Part I: Study of Theoretical Properties. *IEEE Transactions on Signal Processing.* (submitted)

[35] S. Rambhatla, **X. Li**, J. Ren, and J. Haupt. A Dictionary-Based Generalization of Robust PCA Part II: Applications to Hyperspectral Demixing. *IEEE Transactions on Signal Processing.* (submitted)

[36] **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

[37] M. Chen, **X. Li**, and T. Zhao. On Generalization Bounds of a Family of Recurrent Neural Networks. (submitted)
(*Co-first author)

Programming Language	R, MATLAB, C, C++, Python.

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, H. Jiang, 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 Conf. on Sig., Syst., & Comp.	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: ICLR 2019, 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	"Structured Learning with Parsimony in Measurements and Computations: Theory, Algorithms, and Applications" **(Invited)**

    — Institute for Advanced Study, USA   Sep 2018

"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

CONFERENCE SERVICES	Session Chair: "Regularization and Generalization in Learning", ITA workshop, 2018
	Session Chair: "Advanced Compressive Sensing Methods" and "Efficient and Robust Signal Modeling", GlobalSIP, 2015
	Volunteer: ICML, 2016
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 − 2019, SODA 2018, NIPS 2016 − 2019, ICLR 2019, COLT 2019, AISTATS 2016 − 2019, AAAI 2019, SSP 2016, ICASSP 2015 − 2018, GlobalSIP 2015, CVPR 2011
PROFESSIONAL MEMBERSHIPS	American Statistical Association Student Member, 2016
	IEEE Signal Processing Society Student Member, 2015
	IEEE Student Member, 2014 − 2016
	American Mathematical Society Student Member, 2011 − 2013