

Yangyang Xu

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EDUCATION

Rice University, Houston, TX, USA.
Ph.D. in Computational and Applied Mathematics 2014
Thesis: "Block coordinate update method in tensor optimization"
Advisor: Professor Wotao Yin

Chinese Academy of Sciences, Beijing, China.
M.S. in Operations Research 2010

Nanjing University, Nanjing, China.
B.S. in Computational Mathematics 2007

EMPLOYMENT

Rensselaer Polytechnic Institute
Assistant Professor Fall 2017 –

University of Alabama, Tuscaloosa
Assistant Professor Fall 2016 – Summer 2017

University of Minnesota, Twin Cities
Postdoctoral Associate Fall 2015 – Summer 2016
Mentor: Professor Shuzhong Zhang

University of Waterloo
Postdoctoral fellow Fall 2014 – Summer 2015
Advisors: Professors Stephen Vavasis and Henry Wolkowicz

Siemens Corporate Research
Intern. Mentors: Drs. Ioannis Akrotirianakis and Amit Chakraborty Summer 2012
Developed fast algorithms for binary and multi-class Support Vector Machines
with applications to microarray and texture classifications.

RESEARCH INTERESTS

Optimization: nonlinear programming, tensor optimization, stochastic programming
Methods: block update methods, stochastic approximation, first-order methods, operator splitting
Computing: asynchronous parallel computing
Applications: compressed sensing, machine learning, signal processing, data mining

PUBLICATION LIST

Published or accepted

24. **Y. Xu**. [Hybrid Jacobian and Gauss-Seidel proximal block coordinate update methods for linearly constrained convex programming](#). To appear in *SIAM Journal on Optimization*.

23. N. Zhou, Y. Xu, H. Cheng, Z. Yuan and B. Chen. Maximum Correntropy Criterion based Sparse Subspace Learning for Unsupervised Feature Selection. To appear in *IEEE Transactions on Circuits and Systems for Video Technology*.
22. Y. Xu and S. Zhang. Accelerated Primal-Dual Proximal Block Coordinate Updating Methods for Constrained Convex Optimization. To appear in *Computational Optimization and Applications*.
21. Y. Xu. On the convergence of higher-order orthogonality iteration. To appear in *Linear and Multilinear Algebra*.
20. Z. Peng, Y. Xu, M. Yan and W. Yin. On the convergence of asynchronous parallel iteration with unbounded delays. To appear in *Journal of the Operations Research Society of China*.
19. Y. Xu. Accelerated first-order primal-dual proximal methods for linearly constrained composite convex programming. *SIAM Journal on Optimization*, 27(3), 1459–1484, 2017.
18. Y. Xu and W. Yin. A globally convergent algorithm for nonconvex optimization based on block coordinate update. *Journal of Scientific Computing*, 72(2), 700–734, 2017.
17. F. Wen and Y. Xu. HOSVD Based Multidimensional Parameter Estimation for Massive MIMO System from Incomplete Channel Measurements. *Multidimensional Systems and Signal Processing*, 2017.
16. Y. Xu. Fast algorithms for higher-order singular value decomposition from incomplete data. *Journal of Computational Mathematics, Special Issues on Optimization and Structured Solution*, 35(4), 395–420, 2017.
15. Z. Peng, Y. Xu, M. Yan and W. Yin. ARock: an algorithmic framework for asynchronous parallel coordinate updates. *SIAM Journal on Scientific Computing*, 38(5), pp. A2851–A2879, 2016.
14. Z. Peng, T. Wu, Y. Xu, M. Yan and W. Yin. Coordinate Friendly Structures, Algorithms and applications. *Annals of Mathematical Sciences and Applications*, 1(1), 57–119, 2016.
13. N. Zhou, Y. Xu, H. Cheng, J. Fang and W. Pedrycz. Global and local structure preserving sparse subspace learning: an iterative approach to unsupervised feature selection. *Pattern Recognition*, 53, pp. 87–101, 2016.
12. Y. Xu and W. Yin. A fast patch-dictionary method for whole image recovery, *Inverse Problems and Imaging*, 10(2), 563–583, 2016.
11. Y. Xu, I. Akrotirianakis and A. Chakraborty. Proximal gradient method for Huberized support vector machine, *Pattern Analysis and Applications*, 19(4), 989–1005, 2016.
10. Y. Xu and W. Yin. Block stochastic gradient iteration for convex and nonconvex optimization, *SIAM Journal on Optimization*, 25(3), 1686–1716, 2015.
9. Y. Xu, R. Hao, W. Yin and Z. Su. Parallel matrix factorization for low-rank tensor completion, *Inverse Problems and Imaging*, 9(2), 601–624, 2015.
8. Y. Xu. Alternating proximal gradient method for sparse nonnegative Tucker decomposition. *Mathematical Programming Computation*, 7(1), 39–70, 2015.
7. Y. Xu, I. Akrotirianakis and A. Chakraborty. Alternating direction method of multiplier for regularized multiclass support vector machines. *Lecture Note in Computer Science*, 2015.
6. Y. Xu, W. Yin and S. Osher. Learning circulant sensing kernels. *Inverse Problems and Imaging*, 8(3), 901–923, 2014.
5. Y. Xu and W. Yin. A block coordinate descent method for multi-convex optimization with applications to nonnegative tensor factorization and completion. *SIAM Journal on Imaging Sciences*, 6(3), 1758–1789, 2013.
4. M. Lai, Y. Xu and W. Yin. Improved iteratively reweighted least squares for unconstrained smoothed ℓ_q minimization. *SIAM Journal on Numerical Analysis*, 51(2), pp. 927–957, 2013.
3. (Conference) Q. Ling, Y. Xu, W. Yin and Z. Wen. Decentralized low-rank matrix completion, *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pp. 2925–2928, 2012.

2. **Y. Xu** and J. Cui. [Multi-task \$n\$ -vehicle exploration problem: complexity and algorithms.](#) *Journal of Systems Science and Complexity*, pp. 1080–1092, 2012.
1. **Y. Xu**, W. Yin, Z. Wen and Y. Zhang. [An alternating direction algorithm for matrix completion with nonnegative factors.](#) *Journal of Frontiers of Mathematics in China, Special Issues on Computational Mathematics (Springer)*, 2011, pp. 365–384.

Under review

5. **Y. Xu**. [Primal-dual stochastic gradient method for convex programs with many functional constraints.](#)
4. **Y. Xu**. [First-order methods for constrained convex programming based on linearized augmented Lagrangian function.](#)
3. **Y. Xu**. [Asynchronous parallel primal-dual block update methods.](#)
2. X. Gao, **Y. Xu** and S. Zhang. [Randomized primal-dual proximal block coordinate updates.](#)
1. D. Oliveira, H. Wolkowicz and **Y. Xu**. [ADMM for the SDP relaxation of the QAP.](#)

GRANTS

NSF, Division of Mathematical Sciences

Sole PI: Novel numerical approaches for structured optimization problems, 2017–2020 (total \$96,000).

TEACHING EXPERIENCE

Rensselaer Polytechnic Institute

MATP 6600: Introduction to Optimization

Fall 2017

University of Alabama

Math 410/510: Numerical Linear Algebra

Spring 2017

Math 227: Calculus III

Spring 2017

Math 126: Calculus II

Fall 2016

University of Waterloo

Math 137: Calculus I

Summer 2016

INVITED TALKS

First-order methods for convex programs with functional constraints, *UCLA Applied Math Colloquium*. Feb. 07, 2018

Asynchronous parallel primal-dual block update method. *MOPTA*, Lehigh University, Aug. 16–18, 2017.

Accelerated primal-dual methods for linearly constrained convex problems. *SIAM Conference on Optimization*. Vancouver, Canada, May 22–25, 2017.

Orthogonal Candecomp/Parafac Tensor Decomposition. *SIAM Conference on CSE*. Atlanta, GA, Feb. 27 – March 03, 2017.

Primal-dual methods for affinely constrained problems. *Seminar of Mathematical Sciences*, Clemson University, Oct. 20, 2016.

Randomized primal-dual block coordinate updates. *SIAM Conference on Imaging Sciences*. Albuquerque, NM, May 23–26, 2016.

Block stochastic gradient update method. *INFORMS Annual Meeting*. Philadelphia, PA, Nov. 1–4, 2015.

On the convergence of higher-order orthogonality iteration and its extension. *SIAM Conference on Applied Linear Algebra*, Atlanta, GA, Oct. 26–30, 2015.

Compressed higher-order singular value decomposition. *AMMCS-CAIMS Congress*. Wilfrid Laurier University, Waterloo, Canada, June 7–12, 2015

Low-rank tensor recovery via matrix factorization. *SIAM Conference on CSE*. Salt Lake City, March 14–18, 2015.

Parallel matrix factorization for low-rank tensor completion. *SIAM Conference on Optimization*. San Diego, CA, May 19–22, 2014.

Block coordinate descent in tensor optimization. *Colloquium of Math Department*, National University of Singapore, Feb. 10, 2014.

Block coordinate descent for multi-convex optimization. *14th International Conference on Approximation Theory*. San Antonio, TX, April 7–10, 2013.

Decentralized low-rank matrix completion, *CAAM Graduate Seminar*, Rice University, Nov. 2, 2011.

Matrix completion with nonnegative factors, *Colloquium of Math Department*, Shanghai Jiaotong University, Aug. 17, 2011.

PROFESSIONAL ACTIVITIES

Session Organizer

SIAM Conference on CSE, Atlanta, GA, Feb. 27 – March 03, 2017

SIAM Conference on Optimization, San Diego, CA, May 19–22, 2014

INFORMS Optimization Society Conference, Houston, TX, March 6–8, 2014

Journal Referee

Applied Mathematics and Computation

Computational Optimization and Applications

IEEE Signal Processing

IEEE Neural Network and Learning System

Journal of Computational Mathematics

Journal of Global Optimization

Journal of Machine Learning Research

Journal of Mathematical Imaging and Vision

Journal of Operations Research Society of China

Journal of Optimization Theory and Application

Journal of Scientific Computing

Mathematics of Operations Research

Mathematical Programming

Optimization

Pattern Recognition

SIAM Journal on Imaging Sciences

SIAM Journal on Optimization

SIAM Journal on Scientific Computing

HONORS AND AWARDS

Gold paper award, International Consortium of Chinese Mathematicians	2017
Alan Weiser Memorial Travel Award, Rice University	2014
Graduate fellowship, Rice University	2010 – 2011
Championship of the Enterprise Simulation Contest of Chinese Academy of Sciences	2008
First Prize, Scholarship of Nanjing University	2006
First Prize, National Scholarship of China	2005
Samsung Scholarship	2004