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RESEARCH INTERESTS

Optimization, Machine Learning, Data Science, Artificial Intelligence, and Signal Processing.

Appointments

Laboratory for Information and Decision Systems (LIDS), MIT Cambridge, MA
Postdoctoral Associate January 2018 - Present
Hosts: Prof. Asu Ozdaglar and Prof. Ali Jadbabaie

Simons Institute for the Theory of Computing, UC Berkeley Berkeley, CA
Research Fellow August 2017 - December 2017
Program: "Bridging Continuous and Discrete Optimization"

EDUCATION

University of Pennsylvania Philadelphia, PA
Ph.D. in Electrical & Systems Engineering August 2017
Advisor: Prof. Alejandro Ribeiro
Thesis: "Efficient Methods for Large-Scale Empirical Risk Minimization"

University of Pennsylvania (The Wharton School) Philadelphia, PA
A.M. in Statistics August 2017

University of Pennsylvania Philadelphia, PA
M.Sc. in Electrical Engineering May 2014

Sharif University of Technology Tehran, Iran
B.Sc. in Electrical Engineering June 2011

INDUSTRY EXPERIENCES

YAHOO! (Big-data Machine Learning group) Sunnyvale, CA
Research Intern (Intern III) (with Dr. Amir Ingber and Dr. Andrew Feng) Summer 2016

Advanced Digital Sciences Center (Research affiliate of UIUC at Singapore) Singapore, Singapore
Research Scholar (with Prof. David K. Y. Yau and Prof. Richard T. B. Ma) Summer 2010

HONORS and AWARDS

- Joseph and Rosaline Wolf Best Doctoral Dissertation Award (Awarded by the ESE Department of the University of Pennsylvania) Fall 2018
- Research Fellowship from the Simons Institute at UC Berkeley (Program: "Bridging Continuous and Discrete Optimization") Fall 2017
- Travel grant from Center for Discrete Math and Theoretical Computer Sci. (DIMACS) Summer 2017
- University of Pennsylvania GAPSA research travel grant Fall 2016
- Departmental Fellowship, UPenn Spring 2012
- Offered admission to the M.Sc. program as an outstanding undergraduate student and exempted from taking the entrance exam, Sharif University of Technology Fall 2010
- Ranked 121st out of nearly 500,000 applicants in the nation-wide university entrance exam. Fall 2007

PUBLICATIONS

I publish in the following journals and conferences: SIAM Journal on Optimization (SIOPT), Journal of Machine Learning Research (JMLR), IEEE Transactions on Signal Processing (TSP), IEEE Transactions on Automatic Control (TAC), NIPS, ICML, AISTATS, ICASSP, GlobalSIP, CAMSAP, CDC, ACC, ECC.

Thesis

1. **A. Mokhtari**, “Efficient Methods for Large-Scale Empirical Risk Minimization,” Ph.D. Dissertation, University of Pennsylvania, 2017. (**Joseph and Rosaline Wolf Best Doctoral Dissertation Award**). [[pdf](#)]

Preprints

1. **A. Mokhtari**, A. Ozdaglar, and A. Jadbabaie, “Efficient Nonconvex Empirical Risk Minimization via Adaptive Sample Size Methods,” *submitted to International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2019. [[pdf](#)]
2. M. Jahani, X. He, C. Ma, **A. Mokhtari**, A. Ribeiro, D. Mudigere, and M. Takac, “Efficient Distributed Hessian Free Algorithm for Large-scale ERM via Accumulating Sample Strategy,” *submitted to International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2019. [[pdf](#)]
3. A. Reisizadeh, **A. Mokhtari**, H. Hassani, and R. Pedarsani, “An Exact Quantized Decentralized Gradient Descent Algorithm,” *submitted to IEEE Transactions on Signal Processing*, 2018. [[pdf](#)]
4. J. Zhang, C. Uribe, **A. Mokhtari**, and A. Jadbabaie, “Achieving Acceleration in Distributed Optimization via Direct Discretization of the Heavy-Ball ODE,” *submitted to American Control Conf. (ACC)*, 2018. [[pdf](#)]
5. **A. Mokhtari**, H. Hassani, and A. Karbasi, “Stochastic Conditional Gradient Methods: From Convex Minimization to Submodular Maximization,” *submitted to Journal of Machine Learning Research*, 2018. [[pdf](#)]
6. M. Eisen, **A. Mokhtari**, and A. Ribeiro. A Primal-Dual Quasi-Newton Method for Exact Consensus Optimization, *submitted to IEEE Transactions on Signal Processing*, 2018. [[pdf](#)]
7. **A. Mokhtari**, A. Koppel, M. Takac, and A. Ribeiro, “A Class of Parallel Doubly Stochastic Algorithms for Large-Scale Learning,” *submitted to Journal of Machine Learning Research*, 2018. [[pdf](#)]

Journal Papers

1. S. Paternain, **A. Mokhtari**, and A. Ribeiro, “A Newton-based Method for Nonconvex Optimization with Fast Evasion of Saddle Points,” *SIAM Journal on Optimization*, (to appear), 2019. [[pdf](#)]
2. **A. Mokhtari**, M. Eisen, and A. Ribeiro, “IQN: An Incremental Quasi-Newton Method with Local Superlinear Convergence Rate,” *SIAM Journal on Optimization*, vol. 28, no. 2, pp. 1670–1698, 2018. [[pdf](#)]
3. **A. Mokhtari**, M. Gürbüzbalaban, and A. Ribeiro, “Surpassing Gradient Descent Provably: A Cyclic Incremental Method with Linear Convergence Rate,” *SIAM Journal on Optimization*, vol. 28, no. 2, pp. 1420–1447, 2018. [[pdf](#)]
4. A. Simonetto, A. Koppel, **A. Mokhtari**, G. Leus, and A. Ribeiro, “Decentralized Prediction-Correction Methods for Networked Time-Varying Convex Optimization,” *IEEE Transactions on Automatic Control*, vol. 62, no. 11, pp. 5724–5738, Nov. 2017. [[pdf](#)]
5. T. Chen, **A. Mokhtari**, X. Wang, A. Ribeiro, and G. B. Giannakis, “Stochastic Averaging for Constrained Optimization with Application to Online Resource Allocation,” *IEEE Trans. on Signal Process.*, vol. 65, no. 12, pp. 3078–3098, June 15, 2017. [[pdf](#)]
6. M. Eisen, **A. Mokhtari**, and A. Ribeiro, “Decentralized Quasi-Newton Methods,” *IEEE Trans. on Signal Process.*, vol. 65, no. 10, pp. 2613–2628, May 15, 2017. [[pdf](#)]
7. **A. Mokhtari**, Q. Ling, and A. Ribeiro, “Network Newton Distributed Optimization Methods,” *IEEE Trans. on Signal Process.*, vol. 65, no. 1, pp. 146–161, Jan. 1, 2017. [[pdf](#)]

8. **A. Mokhtari** and A. Ribeiro, "DSA: Decentralized Double Stochastic Averaging Gradient Algorithm," *Journal of Machine Learning Research*, 17(61):1-35, 2016. [[pdf](#)]
9. **A. Mokhtari**, W. Shi, Q. Ling, and A. Ribeiro, "A Decentralized Second-Order Method with Exact Linear Convergence Rate for Consensus Optimization," *IEEE Trans. Signal and Info. Process. over Networks*, vol. 2, no. 4, pp. 507-522, Dec. 2016. [[pdf](#)]
10. **A. Mokhtari**, W. Shi, Q. Ling, and A. Ribeiro, "DQM: Decentralized Quadratically Approximated Alternating Direction Method of Multipliers," *IEEE Trans. on Signal Process.*, vol. 64, no. 19, pp. 5158-5173, Oct. 1, 2016. [[pdf](#)]
11. A. Simonetto, **A. Mokhtari**, A. Koppel, G. Leus, and A. Ribeiro, "A Class of Prediction-Correction Methods for Time-Varying Convex Optimization," in *IEEE Transactions on Signal Processing*, vol. 64, no. 17, pp. 4576-4591, Sept. 1, 1 2016. [[pdf](#)]
12. **A. Mokhtari** and A. Ribeiro, "Global Convergence of Online Limited Memory BFGS," *Journal of Machine Learning Research*, vol. 16, pp. 3151-3181, 2015. [[pdf](#)]
13. **A. Mokhtari** and A. Ribeiro, "RES: Regularized Stochastic BFGS Algorithm," *IEEE Trans. Signal Process.*, vol. 62, no. 23, pp. 6089 - 6104, December 2014. [[pdf](#)]

Conference Papers

1. **A. Mokhtari**, A. Ozdaglar, and A. Jadbabaie, "Escaping Saddle Points in Constrained Optimization," in *Advances in Neural Information Processing Systems (NIPS)*, 2018. (Spotlight: Top 4% of the submitted papers) [[pdf](#)]
2. J. Zhang, **A. Mokhtari**, S. Sra, and A. Jadbabaie, "Direct Runge-Kutta Discretization Achieves Acceleration," in *Advances in Neural Information Processing Systems (NIPS)*, 2018. (Spotlight: Top 4% of the submitted papers) [[pdf](#)]
3. A. Reisizadeh, **A. Mokhtari**, H. Hassani, and R. Pedarsani, "Quantized Decentralized Consensus Optimization," *IEEE 57th Conference on Decision and Control (CDC)*, 2018. [[pdf](#)]
4. S. Paternain, **A. Mokhtari**, and A. Ribeiro, "A Newton Method for Faster Navigation in Cluttered Environments," *IEEE 57th Conference on Decision and Control (CDC)*, 2018. [[pdf](#)]
5. **A. Mokhtari**, H. Hassani, and A. Karbasi, "Decentralized Submodular Maximization: Bridging Discrete and Continuous Settings", *International Conference on Machine Learning (ICML)*, PMLR 80:3613-3622, 2018. (Long talk) [[pdf](#)] [[Supplementary Material](#)]
6. Z. Shen, **A. Mokhtari**, H. Qian, P. Zhao, and T. Zhou, "Towards More Efficient Stochastic Decentralized Learning: Faster Convergence and Sparse Communication", *International Conference on Machine Learning (ICML)*, PMLR 80:4631-4640, 2018. [[pdf](#)] [[Supplementary Material](#)]
7. **A. Mokhtari**, H. Hassani, and A. Karbasi, "Conditional Gradient Method for Stochastic Submodular Maximization: Closing the Gap", *Proceedings of the Twenty-First International Conference on Artificial Intelligence and Statistics (AISTATS)*, PMLR 84:1886-1895, 2018. [[pdf](#)] [[Supplementary Material](#)]
8. Mark Eisen, **A. Mokhtari**, and A. Ribeiro, "Large Scale Empirical Risk Minimization via Truncated Adaptive Newton Method", *Proceedings of the Twenty-First International Conference on Artificial Intelligence and Statistics (AISTATS)*, PMLR 84:1447-1455, 2018. [[pdf](#)] [[Supplementary Material](#)]
9. A. Koppel, **A. Mokhtari**, and A. Ribeiro, "Parallel Stochastic Successive Convex Approximation Method for Large-Scale Dictionary Learning," in *Proc. Int. Conf. Acoustics Speech Signal Process. (ICASSP)*, Calgary, Alberta, Canada, 2018. [[pdf](#)]
10. **A. Mokhtari** and A. Ribeiro, "First-Order Adaptive Sample Size Methods to Reduce Complexity of Empirical Risk Minimization", in *Advances in Neural Information Processing Systems (NIPS) 2017*, pp. 2057-2065, Long Beach, CA, December 4-9, 2017. [[pdf](#)] [[Supplementary Material](#)]
11. M. Eisen, **A. Mokhtari**, and A. Ribeiro, "A Primal-Dual Quasi-Newton Method for Consensus Optimization", in *51th Asilomar Conference on Signals, Systems and Computers*, 2017, pp. 298-302. [[pdf](#)]

12. **A. Mokhtari**, M. Eisen, and A. Ribeiro, "An Incremental Quasi-Newton Method with a Local Superlinear Convergence Rate," in *Proc. Int. Conf. Acoustics Speech Signal Process. (ICASSP)*, New Orleans, LA, 2017, pp. 4039-4043. [\[pdf\]](#)
13. **A. Mokhtari**, M. Gürbüzbalaban, and A. Ribeiro, "A Double Incremental Aggregated Gradient Method with Linear Convergence Rate for Large-Scale Optimization," in *Proc. Int. Conf. Acoustics Speech Signal Process. (ICASSP)*, New Orleans, LA, 2017, pp. 4696-4700. [\[pdf\]](#)
14. **A. Mokhtari**, A. Koppel, G. Scutari, and A. Ribeiro, "Large-Scale NonConvex Stochastic Optimization by Doubly Stochastic Successive Convex Approximation," in *Proc. Int. Conf. Acoustics Speech Signal Process. (ICASSP)*, New Orleans, LA, 2017, pp. 4701-4705. [\[pdf\]](#)
15. **A. Mokhtari**, and A. Ingber, "A Diagonal-Augmented Quasi-Newton Method with Application to Factorization Machines," in *Proc. Int. Conf. Acoustics Speech Signal Process. (ICASSP)*, New Orleans, LA, 2017, pp. 2671-2675. [\[pdf\]](#)
16. **A. Mokhtari**, H. Daneshmand, A. Lucchi, T. Hofmann, and A. Ribeiro, "Adaptive Newton Method for Empirical Risk Minimization to Statistical Accuracy", in *Advances in Neural Information Processing Systems (NIPS) 2016*, pp. 4062-4070, Barcelona, Spain, Dec. 5-10, 2016. [\[pdf\]](#) [\[Supplementary Material\]](#)
17. T. Chen, **A. Mokhtari**, X. Wang, A. Ribeiro, and G. B. Giannakis, "A Data-driven Approach to Stochastic Network Optimization", *2016 IEEE Global Conference on Signal and Information Processing (GlobalSIP)*, Washington DC, DC, USA, 2016, pp. 510-514. [\[pdf\]](#)
18. H. Zhang, W. Shi, **A. Mokhtari**, A. Ribeiro, and Q. Ling, "Decentralized Constrained Consensus Optimization with Primal-Dual Splitting Projection", *2016 IEEE Global Conf. on Signal and Inform. Process. (GlobalSIP)*, Washington DC, DC, USA, 2016, pp. 565-569. [\[pdf\]](#)
19. M. Eisen, **A. Mokhtari**, and A. Ribeiro, "An Asynchronous Quasi-Newton Method for Consensus Optimization", *2016 IEEE Global Conference on Signal and Information Processing (GlobalSIP)*, Washington DC, DC, USA, 2016, pp. 570-574. [\[pdf\]](#)
20. **A. Mokhtari**, W. Shi, and Qing Ling, "ESOM: Exact Second-Order Method for Consensus Optimization," *50th Asilomar Conf. on Signals, Systems and Computers*, Pacific Grove, CA, 2016, pp. 783-787. [\[pdf\]](#)
21. A. Koppel, **A. Mokhtari**, and A. Ribeiro, "Doubly Stochastic Algorithms for Large-Scale Optimization," *50th Asilomar Conf. on Signals, Systems and Computers*, Pacific Grove, CA, 2016, pp. 1705-1709. [\[pdf\]](#)
22. **A. Mokhtari**, S. Shahrampour, A. Jadbabaie, and A. Ribeiro, "Online Optimization in Dynamic Environments: Improved Regret Rates for Strongly Convex Problems", *IEEE 55th Conf. on Decision and Control (CDC)*, pp. 7195-7201, Las Vegas, NV, 2016. [\[pdf\]](#)
23. **A. Mokhtari**, W. Shi, Q. Ling, and A. Ribeiro, "A Decentralized Second-Order Method for Dynamic Optimization", *IEEE 55th Conf. on Decision and Control (CDC)*, pp. 6036-6043, Las Vegas, NV, 2016. [\[pdf\]](#)
24. M. Eisen, **A. Mokhtari**, and A. Ribeiro, "A Decentralized Quasi-Newton Method for Dual Formulations of Consensus Optimization," *IEEE 55th Conf. on Decision and Control (CDC)*, pp. 1951-1958, Las Vegas, NV, 2016. [\[pdf\]](#)
25. A. Simonetto, A. Koppel, **A. Mokhtari**, G. Leus, and A. Ribeiro, "A Quasi-Newton Prediction-Correction Method for Decentralized Dynamic Convex Optimization," *European Control Conference (ECC)*, pp. 1934-1939, Aalborg, Denmark, 2016. [\[pdf\]](#)
26. **A. Mokhtari**, A. Koppel, and A. Ribeiro, "Doubly Random Parallel Stochastic Methods for Large Scale Learning," *American Control Conference (ACC)*, pp. 4847-4852, 2016. [\[pdf\]](#)
27. A. Simonetto, **A. Mokhtari**, A. Koppel, G. Leus, and A. Ribeiro, "A Decentralized Prediction-Correction Method for Networked Time-Varying Convex Optimization," *IEEE 6th International Workshop on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP)*, pp. 509-512, 2015. [\[pdf\]](#)
28. **A. Mokhtari**, W. Shi, Q. Ling, and A. Ribeiro, "Decentralized Quadratically Approximated Alternating Direction Method of Multipliers", in *Proc. IEEE Global Conf. on Signal and Inform. Process.*, pp. 795-799, Orlando, FL, Dec. 14-16, 2015. [\[pdf\]](#)
29. A. Koppel, A. Simonetto, **A. Mokhtari**, G. Leus, and A. Ribeiro, "Target Tracking with Dynamic Convex

- Optimization,” in *Proc. IEEE Global Conf. on Signal and Inform. Process.*, pp. 1210-1214, Orlando, FL, Dec. 14-16, 2015. [pdf]
30. **A. Mokhtari** and A. Ribeiro, “Decentralized Double Stochastic Averaging Gradient,” in *Proc. Asilomar Conference on signals, systems, and computers*, pp. 406-410, 2015. [pdf]
 31. A. Simonetto, A. Koppel, **A. Mokhtari**, G. Leus, and A. Ribeiro, “Prediction-Correction Methods for Time-Varying Convex Optimization,” in *Proc. Asilomar Conference on signals, systems, and computers*, pp. 666-670, Pacific Grove, CA, Nov. 8-11, 2015. [pdf]
 32. **A. Mokhtari**, Q. Ling, and A. Ribeiro, “An Approximate Newton Method for Distributed Optimization,” *Proc. Int. Conf. Acoustics Speech Signal Process.*, pp. 2959-2963, 2015. [pdf]
 33. **A. Mokhtari**, Q. Ling, and A. Ribeiro, “Network Newton,” in *Proc. Asilomar Conf. on signals, systems, and computers*, pp. 1621-1625, Pacific Grove, CA, Nov. 2-5, 2014. [pdf]
 34. **A. Mokhtari** and A. Ribeiro, “A Quasi-Newton Method for Large Scale Support Vector Machines,” in *Proc. Int. Conf. Acoustics Speech Signal Process.*, pp. 8302-8306, 2014. [pdf]
 35. **A. Mokhtari** and A. Ribeiro, “Regularized Stochastic BFGS algorithm,” in *Proc. IEEE Global Conf. on Signal and Inform. Process.*, pp.1109-1112, Austin, TX, Dec, 2013. [pdf]
 36. **A. Mokhtari** and A. Ribeiro, “A Dual Stochastic DFP Algorithm for Optimal Resource Allocation in Wireless Systems,” in *Proc. IEEE Workshop on Signal Process. Advances in Wireless Commun. (SPAWC)*, pp. 21-25, Darmstadt, Germany, June 16-19, 2013. [pdf]

TEACHING EXPERIENCE

Teaching Assistant for “Linear Systems Theory”, UPenn	Fall 2015
Teaching Assistant for “Signal and Information Processing”, UPenn	Spring 2015
Teaching Assistant for “Engineering Applications of Statistics”, UPenn	Fall 2014
Teaching Assistant for “Stochastic Systems Analysis and Simulation”, UPenn	Fall 2013
Teaching Assistant for “Modern Convex Optimization”, UPenn	Spring 2013

MENTORSHIP EXPERIENCE (Student Project Co-supervisor)

- **Sarath Pattathil**, (Ph.D. project, MIT) Fall 2018 - Present
– Project: “Optimistic Descent Methods for Saddle Point Problems”
- **Jingzhao Zhang**, (Ph.D. project, MIT) Spring 2018 - Present
– Project: “Optimization Algorithms under a Dynamical System Lens”
- **Mark Eisen**: (Ph.D. project, UPenn) Fall 2015 - Spring 2017
– Project: “Quasi-Newton Methods for Distributed Consensus Optimization”
- **Christian Wang**: (Undergraduate project, UPenn) Summer 2015 - Spring 2016
– Project: “GPU Implementation of Doubly Stochastic Algorithms for Large-scale Learning Problems”
- **Mitchell Stern**: (Undergraduate project, UPenn) Summer 2014 - Spring 2015
– Project: “Online Limited-Memory BFGS for Click-Through Rate Prediction”

MAJOR TALKS

- “Escaping Saddle Points in Constrained Optimization”
Infirms Annual Meeting, November 2018.
- “Achieving Acceleration via Direct Discretization of Heavy-Ball ODE”
DIMACS workshop on Optimization and Machine Learning, August 2018. *(Invited Talk)*
- “Surpassing Gradient Descent Provably: A Linearly Convergent Cyclic Incremental Method”
Infirms Annual Meeting, October 2017. *(Invited Talk)*

- “Incremental Quasi-Newton Methods with Local Superlinear Convergence Rate”
International Conference Acoustics, Speech, and Signal Processing (ICASSP), March 2017.
- “Incremental Quasi-Newton Methods with Local Superlinear Convergence Rate”
Information Theory and Applications (ITA) Workshop (Graduation Day), February 2017.
- “High-order methods for ERM”
Google Tech Talk, January 2017.
- “Online Optimization in Dynamic Environments”
Conference on Decision and Control (CDC), December 2016.
- “DQM: Decentralized Quadratically Approximated ADMM”
Informs Annual Meeting, November 2016. (*Invited Talk*)
- “ESOM: Exact Second-Order Method for Consensus Optimization”
Asilomar Conference on Signals, Systems, and Computers, November 2016.
- “Stochastic Quasi-Newton Methods”
Yahoo! Tech Talk, August 2016.
- “DSA: A Decentralized Stochastic Averaging Method with Linear Convergence Rate”
INFORMS Optimization Society Conference 2016, March 2016.
- “Decentralized Quadratically Approximated Alternating Direction Method of Multipliers”
IEEE Global Conference on Signal and Information Processing, December 2015.
- “Decentralized Double Stochastic Averaging Gradient”
Asilomar Conference on Signals, Systems, and Computers, November 2015.
- “Stochastic Quasi-Newton Methods”
ESE PhD Colloquia, UPenn, October 2015.
- “Global Convergence of Stochastic Quasi-Newton Methods”
International Symposium on Mathematical Programming (ISMP), July 2015. (*Invited Talk*)
- “Network Newton”
Asilomar Conf. on Signals, Systems, & Computers, November 2014.
- “Regularized Stochastic BFGS Algorithm”
IEEE Global Conference on Signal and Information Processing, December 2013.

PROFESSIONAL SERVICE

- Technical Program Committee (TPC) member of Global SIP 2017 and 2018
- Co-chair of:
 - Session on “Optimization for Machine Learning” at INFORMS Annual Meeting, 2018
 - Session on “Large-scale Optimization” at INFORMS Annual Meeting, 2018
 - Session on “Algorithms for Nonconvex Optimization” at INFORMS Optimization Society Conf., 2018
 - Session on “Submodular Maximization” at INFORMS Optimization Society Conf., 2018
 - Session on “Distributed Optimization and Learning” at Asilomar Conference, 2017
- Reviewer for the following journals:
 - SIAM Journal on Optimization (SIOPT), Mathematical Programming Journal, Journal of Machine Learning Research (JMLR), IEEE Transactions on Signal Processing (TSP), IEEE Transactions on Automatic Control (TAC), IEEE Transactions on Control of Network Systems (TCNS), IEEE Transactions on Signal and Information Processing over Networks (TSIPN), Journal of Selected Topics in Signal Processing (JSTSP), IEEE Transactions on Network Science and Engineering (TNSE), IEEE Signal Processing Letters (SPL)
- Reviewer for the following conferences:
 - Neural Information Processing Systems Conference (NIPS), International Conference on Machine Learning (ICML), International Conference on Artificial Intelligence and Statistics (AISTATS), IEEE American Control Conference (ACC), IEEE Conference on Decision and Control (CDC), IEEE Conference on Control Technology and Applications (CCTA), IEEE Global Conference on Signal and Information Processing (GlobalSIP)