Renbo Zhao

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Google Scholar https://scholar.google.com.sg/citations?user=gi_G33wAAAAJ&hl=en
(225 citations till now)

Education

Massachusetts Institute of Technology
PhD in Operations Research, September 2018 – Present

- Thesis advisor: Robert M. Freund

National University of Singapore
M.Sc. in Mathematics, August 2016 – June 2018

- Thesis: Stochastic and Randomized Algorithms for Large-Scale Optimization in Machine Learning
- Thesis advisors: Vincent Y. F. Tan and William B. Haskell

National University of Singapore
B.Eng. in Electrical Engineering (First Class Honours), August 2011 – June 2015

- Thesis: Online Nonnegative Matrix Factorization with Outliers
- Thesis advisor: Vincent Y. F. Tan

Research Experiences

Amazon (Seattle), Research Intern, Summer 2021

- Worked on primal-dual hybrid gradient method for solving the two-stage stochastic resource planning problem in Amazon's middle-mile delivery networks.

Microsoft Research (Redmond), Research Intern, Summer 2020

- Worked on inexact Bregman augmented Lagrangian method and Bregman alternating direction method of multipliers for large-scale optimal transport problems.

IBM AI Research (Yorktown Heights), Research Intern, Summer 2019

- Worked on Bayesian optimal experimental design for symbolic regression problems.

École Polytechnique Fédérale de Lausanne (EPFL), Research Intern, Summer 2017

- Worked on primal-dual algorithms for stochastic three-composite convex minimization with a linear operator.

National University of Singapore (NUS), Research Engineer, Jul. 2015 – Aug. 2018

- Worked on stochastic and randomized algorithms for large-scale optimization in machine learning.
- Worked on machine learning algorithms for online matrix factorization and ranking from pairwise comparisons.

Awards 2014, 2015: Innovation and Research Merit Award, Faculty of Engineering, NUS

2013: ST Electronics Prize (Top sophomore student in Electrical Engineering)

2011 – 2015: Dean's List, every semester throughout undergraduate studies

Student Travel Grants: SIOP 2021, ICCOPT 2019, AISTATS 2017, UAI 2017

Published Journal Papers

"Accelerated Algorithms for Stochastic Three-Composite Convex-Concave Saddle Point Problems", Renbo Zhao, arXiv:1903.01687v2, to appear in *Mathematics of Operations Research.*

"Structured sparse K-means clustering via Laplacian smoothing", Weikang Gong, Renbo Zhao, Stefan Grünewald, *Pattern Recognition Letters*, Vol. 112, Pages 63–69, Sep. 2018.

"Stochastic L-BFGS: Improved Convergence Rates and Practical Acceleration Strategies", Renbo Zhao, William B. Haskell and Vincent Y. F. Tan, *IEEE Transactions on Signal Processing*, Vol. 66, No. 5, Pages 1155—1169, Mar. 2018.

"A Unified Convergence Analysis of the Multiplicative Update Algorithm for Regularized Nonnegative Matrix Factorization", Renbo Zhao and Vincent Y. F. Tan, in *IEEE Transactions on Signal Processing*, Vol. 66, No. 1, Pages 129—138, Jan. 2018.

"Adversarial Top-K Ranking", Changho Suh, Vincent Y. F. Tan and Renbo Zhao, in *IEEE Transactions Information Theory*, Vol. 63, No. 4, Pages 2201—2225, Apr. 2017.

"Online Nonnegative Matrix Factorization with Outliers", Renbo Zhao and Vincent Y. F. Tan, in *IEEE Transactions on Signal Processing*, Vol. 65, No. 3, Pages 555–570, Feb. 2017.

Working Papers

"An Inexact Primal Dual Smoothing Framework for Large-Scale Non-Bilinear Saddle Point Problems", Le Thi Khanh Hien, Renbo Zhao and William B. Haskell, arXiv:1711.03669v3, submitted to *Journal of Optimization Theory and Applications.*

"Analysis of Frank-Wolfe Method for Logarithmically-Homogeneous Barriers, with an Extension", Renbo Zhao and Robert M. Freund, submitted to *Mathematical Programming Series A*.

"A Primal Dual Smoothing Framework for Max-Structured Nonconvex Optimization", Renbo Zhao, arXiv:2003.04375, submitted to *Mathematics of Operations Research.*

Conference Proceedings

“An Optimal Algorithm for Stochastic Three-Composite Optimization”, Renbo Zhao, William B. Haskell and Vincent Y. F. Tan, in *Proc. 22nd Int. Conf. Artif. Intell. Stat. (AISTATS)*, Okinawa, Japan, Apr. 2019.

“Stochastic Three-Composite Convex Minimization with a Linear Operator”, Renbo Zhao and Volkan Cevher, in *Proc. 21st Int. Conf. Artif. Intell. Stat. (AISTATS)*, Lanzarote, Canary Islands, Spain, Apr. 2018.

“Stochastic L-BFGS Revisited: Improved Convergence Rates and Practical Acceleration Strategies”, Renbo Zhao, William B. Haskell and Vincent Y. F. Tan, in *Proc. 33rd Conf. Uncertain. Artif. Intell. (UAI)*, Sydney, Australia, Aug. 2017.

“Online Nonnegative Matrix Factorization with General Divergences”, Renbo Zhao, Vincent Y. F. Tan and Huan Xu, in *Proc. 20th Int. Conf. Artif. Intell. Stat. (AISTATS)*, Pages 37–45, Fort Lauderdale, FL, USA, Apr. 2017.

“A Unified Convergence Analysis of the Multiplicative Update Algorithm for Nonnegative Matrix Factorization”, Renbo Zhao and Vincent Y. F. Tan, in *Proc. 42nd IEEE Int. Conf. Acoust. Speech Signal Process. (ICASSP)*, Pages 2562–2566, New Orleans, LA, USA, Mar. 2017.

“Online Nonnegative Matrix Factorization with Outliers”, Renbo Zhao and Vincent Y. F. Tan, in *Proc. 41st IEEE Int. Conf. Acoust. Speech Signal Process. (ICASSP)*, Pages 2662–2666, Shanghai, China, Mar. 2016.

“Soft Constrained Leading Voice Separation with Music Score Guidance”, Renbo Zhao, Siu Wa Lee, Dong-Yan Huang and Minghui Dong, in *Proc. 9th ISCA/IEEE Int. Symp. Chin. Spok. Lang. Process. (ISCSLP)*, Pages 565–569, Singapore, Sep. 2014.

Talks

Analysis of the Frank-Wolfe Method for Logarithmically-Homogeneous Barriers

- SIAM Conference on Optimization, Virtual, Jul. 2021.
- MLO Group meeting, Microsoft Research Redmond, Virtual, Sep. 2020

A Primal Dual Smoothing Framework for Max-Structured Nonconvex Optimization

- INFORMS Annual Meeting, Virtual, Nov. 2020

Optimal Stochastic Algorithms for Convex-Concave Saddle Point Problems

- INFORMS Annual Meeting, Seattle, WA, Oct. 2019
- Department of ISEM, NUS, Singapore, May 2019
- RPI Applied Math Days, Troy, NY, Apr. 2019

An Inexact Primal Dual Smoothing Framework for Large-Scale Non-Bilinear Saddle Point Problems

- INFORMS Annual Meeting, Seattle, WA, Oct. 2019
- MIT LIDS Student Conference, Jan. 2019

An Optimal Algorithm for Stochastic Three-Composite Optimization

- International Symposium on Mathematical Programming (ISMP), Bordeaux, France, Jul. 2018
- INFORMS Annual Meeting, Phoenix, Arizona, Nov. 2018

Professional Activities

Student Member, INFORMS, IEEE

Session Chair: SIAM Conference on Optimization 2021, INFORMS Annual Meeting 2019

Computer Skills

Python, MATLAB, R, Julia

Languages

English (bilingual and biliterate), Chinese (native)