Baoyu Zhou

CONTACT INFORMATION

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RESEARCH INTERESTS

Multi-stage Stochastic Programming, Large-scale Nonlinear Optimization, Constrained Stochastic Optimization, Nonsmooth Optimization, Optimization Methods for Machine Learning

ACADEMIC POSITIONS

Postdoctoral Researcher Aug. 2022 – present
The University of Michigan, Ann Arbor, MI
Department of Industrial and Operations Engineering
Supervisor: Prof. Albert S. Berahas
The University of Chicago, Chicago, IL
Booth School of Business
Supervisor: Prof. Haihao (Sean) Lu
Topics: Two-stage Stochastic Programming, Convex Constrained Optimization

EDUCATION

Lehigh University
Ph.D. in Industrial & Systems Engineering Aug. 2018 – May 2022
Advisor: Prof. Frank E. Curtis
Doctoral Committee: Frank E. Curtis (Lehigh), Albert S. Berahas (U of Michigan), Jorge Nocedal (Northwestern), Daniel P. Robinson (Lehigh), and Luis Nunes Vicente (Lehigh)
M.S. in Industrial & Systems Engineering Aug. 2016 – May 2018
Shanghai Jiao Tong University
B.S.E. in Mechanical Engineering Aug. 2012 – Aug. 2016
The Chinese University of Hong Kong
Undergraduate Exchange Student Jan. 2015 – Apr. 2015

RESEARCH EXPERIENCE

Research Assistant Aug. 2018 – May 2022
Lehigh University, Bethlehem, PA
Department of Industrial & Systems Engineering
Supervisor: Prof. Frank E. Curtis
Topics: Large-scale Nonlinear Optimization, Constrained Stochastic Optimization

Research Intern May 2021 – Aug. 2021
Facebook, Inc., New York, NY
Facebook AI Research
Supervisor: Dr. Aaron Defazio
Topics: Nonconvex and Stochastic Optimization with Deep Learning Applications.

Givens Associate May 2020 – Aug. 2020
Argonne National Laboratory, Lemont, IL
Mathematics and Computer Science Division
Supervisor: Dr. Jeffrey M. Larson
Topics: Composite Nonsmooth Optimization under Derivative-Free Setting.

Visiting Research Assistant June 2017 – Aug. 2017
Northwestern University, Evanston, IL

Department of Industrial Engineering and Management Sciences
Supervisor: Prof. Andreas Wächter
Topics: Quadratic Programming with Bound Constraints.

Published Journal Articles

[1] A. S. Berahas, J. Shi, Z. Yi, and **B. Zhou**. Accelerating Stochastic Sequential Quadratic Programming for Equality Constrained Optimization using Predictive Variance Reduction. *Computational Optimization and Applications*, https://doi.org/10.1007/s10589-023-00483-2, 2023.

[2] A. S. Berahas, F. E. Curtis, and **B. Zhou**. Limited-Memory BFGS with Displacement Aggregation. *Mathematical Programming*, 194(1):121-157, 2022.

[3] J. Larson, M. Menickelly, and **B. Zhou**. Manifold Sampling for Optimizing Nonsmooth Nonconvex Compositions. *SIAM Journal on Optimization*, 31(4):2638-2664, 2021.

[4] A. S. Berahas, F. E. Curtis, D. P. Robinson, and **B. Zhou**. Sequential Quadratic Optimization for Nonlinear Equality Constrained Stochastic Optimization. *SIAM Journal on Optimization*, 31(2):1352-1379, 2021.

[5] F. E. Curtis, D. P. Robinson, and **B. Zhou**. A Self-Correcting Variable-Metric Algorithm Framework for Nonsmooth Optimization. *IMA Journal of Numerical Analysis*, 40(2):1154-1187, 2020.

Papers Under Review

[6] J. C. N. Liang, H. Lu, and **B. Zhou**. Online Ad Procurement in Non-stationary Autobidding Worlds. arXiv 2307.05698, 2023.

[7] F. E. Curtis, D. P. Robinson, and **B. Zhou**. Sequential Quadratic Optimization for Stochastic Optimization with Deterministic Nonlinear Inequality and Equality Constraints. arXiv 2302.14790, 2023.

[8] A. S. Berahas, M. Xie, and **B. Zhou**. A Sequential Quadratic Programming Method with High Probability Complexity Bounds for Nonlinear Equality Constrained Stochastic Optimization. arXiv 2301.00477, 2023.

[9] A. S. Berahas, R. Bollapragada, and **B. Zhou**. An Adaptive Sampling Sequential Quadratic Programming Method for Equality Constrained Stochastic Optimization. arXiv 2206.00712, 2022.

[10] F. E. Curtis, D. P. Robinson, and **B. Zhou**. Inexact Sequential Quadratic Optimization for Minimizing a Stochastic Objective Function Subject to Deterministic Nonlinear Equality Constraints. arXiv 2107.03512, 2021.

Preprints

[11] A. Defazio, **B. Zhou**, and L. Xiao. Grad-GradaGrad? A Non-Monotone Adaptive Stochastic Gradient Method. arXiv 2206.06900, 2022.

Dissertations

[12] **B. Zhou**. Methods for Large Scale Nonlinear Optimization and Equality Constrained Stochastic Optimization. Ph.D. Thesis, Department of Industrial & Systems Engineering, Lehigh University, Bethlehem, PA, USA, 2022.

[13] **B. Zhou**. Quadratic Optimization for Nonsmooth Optimization Algorithms: Thoery and Numerical Experiments. Master Thesis, Department of Industrial & Systems Engineering, Lehigh University, Bethlehem, PA, USA, 2018.

Technical Reports

[14] H. Huang, H. Feng, **B. Zhou**, E. Pan, and L. Xi. Multi-Objective Cell Formation Problem Considering Mixed-Type Data of Parts. *Technical Report* (in Chinese), 2016.

PRESENTATIONS

[1] Baoyu Zhou. Inexact Bundle Methods for Two-Stage Stochastic Programming. *School of Mathematics, The University of Edinburgh, Edinburgh, Scotland*, July 2023.

[2] Baoyu Zhou. Inexact Bundle Methods for Two-Stage Stochastic Programming. *SIAM Conference on Optimization, Seattle, WA, USA*, June 2023.

[3] Baoyu Zhou. SQP Methods for Deterministically Constrained Stochastic Optimization. *Department of Systems and Industrial Engineering, The University of Arizona, Tucson, AZ, USA*, February 2023.

[4] Baoyu Zhou. SQP Methods for Inequality Constrained Stochastic Optimization. *INFORMS Annual Meeting, Indianapolis, IN, USA*, October 2022.

[5] Baoyu Zhou. SQP Methods for Deterministically Constrained Stochastic Optimization. *FutureBAProf Workshop, The University of Iowa, Iowa City, IA, USA*, August 2022.

[6] Baoyu Zhou. SQP Methods for Inequality Constrained Stochastic Optimization. *International Conference on Continuous Optimization, Bethlehem, PA, USA*, July 2022.

[7] Baoyu Zhou. Fast, Efficient and Practical Algorithms for Nonlinear Optimization. *Department of Industrial, Manufacturing and Systems Engineering, Texas Tech University, Lubbock, TX, USA*, December 2021.

[8] Baoyu Zhou. An Inexact Sequential Quadratic Method For Nonlinear Equality Constrained Stochastic Optimization. *INFORMS Annual Meeting, Anaheim, CA, USA*, October 2021.

[9] Baoyu Zhou. Manifold Sampling for Optimizing Nonsmooth Nonconvex Compositions. *MOPTA Conference, Bethlehem, PA, USA*, August 2021.

[10] Baoyu Zhou. SQP for Nonlinear Equality Constrained Stochastic Optimization. *MOPTA Conference, Bethlehem, PA, USA*, August 2021.

[11] Baoyu Zhou. SQP Methods for Equality Constrained Stochastic Optimization. *SIAM Conference on Optimization, Spokane, WA, USA*, July 2021.

[12] Baoyu Zhou. Manifold Sampling for Optimizing Nonsmooth Nonconvex Compositions. *SIAM Conference on Computational Science and Engineering, Fort Worth, TX, USA*, March 2021.

[13] Baoyu Zhou. Manifold Sampling for Optimizing Nonconvex Piecewise-Smooth Compositions. *INFORMS Annual Meeting, National Harbor, MD, USA*, November 2020.

[14] Baoyu Zhou. Limited-Memory BFGS with Displacement Aggregation. *INFORMS Annual Meeting, Seattle, WA, USA*, October 2019.

[15] Baoyu Zhou. Limited-Memory BFGS with Displacement Aggregation. *MOPTA Conference, Bethlehem, PA, USA*, August 2019.

TEACHING EXPERIENCE

Bootcamp Organizer and Instructor Aug. 2021
Lehigh University, Bethlehem, PA

Teaching Assistant Mentor Sept. 2014 – Aug. 2016
Shanghai Jiao Tong University, Shanghai, China

Undergraduate Teaching Assistant
Shanghai Jiao Tong University, Shanghai, China
VV156: Honors Calculus II — Fall 2013, Spring 2014, Fall 2015
VM240: Intro to Dynamics and Vibrations — Summer 2015

PROFESSIONAL EXPERIENCE

Cost Engineer Intern Mar. 2016 – May 2016
Fiat Chrysler Automobiles, Shanghai, China

Technical Assistant Intern Aug. 2015 – Sept. 2015
Shenyang Blower Works Group Corporation, Shenyang, China

HONORS & AWARDS

Elizabeth V. Stout Dissertation Award, Lehigh University 2022

SIAM Student Travel Award 2021

Van Hoesen Family Best Publication Award, Lehigh ISE Department 2021

P.C. Rossin Doctoral Fellow, Lehigh University 2021

Ph.D. Student of the Year, Lehigh ISE Department 2021

Lehigh University Fellowship 2018 – 2019

Outstanding Freshman Scholarship, Shanghai Jiao Tong University 2012 – 2016

Outstanding Academic Scholarship, Shanghai Jiao Tong University 2015

MENTORSHIP EXPERIENCE

Ph.D. Students

- Jinwen Yang (University of Chicago) 2023 – present

  co-supervised with Prof. Haihao (Sean) Lu

  Topics: Quasi-Newton methods for Constrained Optimization Problems

- Jiahao Shi (University of Michigan) 2021 – present

  co-supervised with Prof. Albert S. Berahas

  Topics: Algorithms for Constrained Stochastic and Derivative-Free Optimization

Undergraduate Students

- Zihong Yi (University of Michigan) 2021 – 2022

  co-supervised with Prof. Albert S. Berahas

  Topics: Accelerating Stochastic Sequential Quadratic Programming for Equality Constrained Optimization using Predictive Variance Reduction

ACADEMIC SERVICE

Professional Affiliations

- Society for Industrial and Applied Mathematics (SIAM) 2021 – present
- Institute for Operations Research and Management Sciences (INFORMS) 2018 – present

Professional Community Service

- Vice President, Lehigh University INFORMS Student Chapter 2020 – 2021

Organized Conference Sessions

- ICCOPT Conference
  - *Advances in Nonlinear Optimization*, Bethlehem, PA, USA, July 2022.
  - *Large-Scale, Nonlinear, and Stochastic Optimization IV*, Bethlehem, PA, USA, July 2022.
- INFORMS Annual Meeting
  - *Recent Advances in Nonlinear and Stochastic Optimization*, Indianapolis, IN, USA, October 2022.
  - *Nonlinear and Stochastic Optimization*, Indianapolis, IN, USA, October 2022.
  - *Advances in Nonlinear and Stochastic Optimization (I–II)*, Anaheim, CA, USA, October 2021.
  - *Optimization in Quantum Computing and vice versa I*, Anaheim, CA, USA, October 2021.
- MOPTA Conference
  - *Nonlinear and Stochastic Optimization Algorithms*, Bethlehem, PA, USA, August 2021.
  - *Algorithms for Derivative-Free Optimization*, Bethlehem, PA, USA, August 2021.

- SIAM Conference on Optimization

- *Recent Advances in Large-Scale Nonlinear Optimization I-II (Sessions I-IV)*, Seattle, WA, USA, May 2023.

Journals Reviewed for (# of articles reviewed)

- Computational Optimization and Applications (3)
- IEEE Transactions on Automatic Control (1)
- IEEE Transactions on Network Science and Engineering (1)
- IEEE Transactions on Neural Networks and Learning Systems (3)
- IEEE Transactions on Pattern Analysis and Machine Intelligence (1)
- Journal of Machine Learning Research (2)
- Journal of Optimization Theory and Applications (1)
- Machine Learning (1)
- Management Science (1)
- Mathematical Programming (2)
- Mathematical Programming Computation (1)
- Mathematics of Computation (1)
- Optimization Methods and Software (2)
- SIAM Journal on Matrix Analysis and Applications (1)
- SIAM Journal on Optimization (3)

Conferences Reviewed for (# of articles reviewed)

- When Machine Learning meets Dynamical Systems: Theory and Applications (MLmDS) Workshop, AAAI 2023 (1)
- Optimization for Machine Learning (OPT) Workshop, NeurIPS 2022 (3)
- New Frontiers in Federated Learning (NFFL) Workshop, NeurIPS 2021 (3)
- Optimization for Machine Learning (OPT) Workshop, NeurIPS 2021 (3)
- Optimization for Machine Learning (OPT) Workshop, NeurIPS 2020 (4)

COURSES

Convex Analysis; Planning & Scheduling in Manufacturing & Services; Optimization Models & Applications; Nonlinear Optimization; Random Processes & Applications; Intro to Math Optimization; Real Analysis I; Discrete Optimization; Computational Methods in Optimization; Dynamic Programming; Applied Operations Research; Optimization Methods in Machine Leaning; Mining of Large Datasets; Quantum Computing for Optimization

COMPUTER SKILLS

Programming Language: C/C++, Julia, MATLAB, Python, R

Software: AMPL, LINGO, Mathematica, LaTeX

Solver: CPLEX, MOSEK, GUROBI, SEDUMI

LANGUAGES

Mandarin (*native language*), English (*bilingual proficiency*)