Yue Xie, PhD

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Websites: https://yue-xie.github.io/ • https://datascience.hku.hk/people/yue-xie/
Research interests: optimization algorithm design and analysis, machine learning, optimal transport

Work Experience

HKU Musketeers Foundation Institute of Data Science (HKU-IDS) and Department of Mathematics, The University of Hong Kong — Hong Kong, China
Research Assistant Professor — **11/01/2021 – present**

Education & Training

Wisconsin Institute for Discovery, University of Wisconsin-Madison — Madison, WI, USA
Postdoctoral Associate — **10/22/2018 – 08/31/2021**
Supervisor: Stephen J. Wright

Pennsylvania State University — State College, PA, USA
PhD in Industrial Engineering — **08/25/2013 – 08/11/2018**
Dual Title Degree for Operations Research
Thesis advisor: Uday V. Shanbhag

Tsinghua University — Beijing, China
Pure & Applied Mathematics — **09/01/2009 – 07/11/2013**

Publications

Journal Paper Published:

- Yue Xie and Stephen J. Wright, *Complexity of a Projected Newton-CG Method for Optimization with Bounds*, **Mathematical Programming series A**, 2023. https://doi.org/10.1007/s10107-023-02000-z.
- Yue Xie and Stephen J. Wright, *Complexity of proximal augmented Lagrangian for nonconvex optimization with nonlinear equality constraints*, **Journal of Scientific Computing**, 2021. https://link.springer.com/article/10.1007/s10915-021-01409-y.
- Yue Xie and Uday V. Shanbhag, *Tractable ADMM schemes for computing KKT points and local minimizers for ℓ_0-minimization problems*, **Computational Optimization and Application**, 2020. http://link.springer.com/article/10.1007/s10589-020-00227-6.
- Yue Xie and Uday V. Shanbhag, *SI-ADMM: A stochastic inexact ADMM framework for stochastic convex programs*, **IEEE Transactions on Automatic Control**, vol. 65, no. 6, pp. 2355-2370, 2020. https://doi.org/10.1109/TAC.2019.2953209.
- Yue Xie and Uday V. Shanbhag, *On robust solutions to uncertain linear complementarity problems and their variants*, **SIAM Journal on Optimization**, 26(4), pp. 2020-2159, 2016. https://doi.org/10.1137/15M1010427.

Electronic Preprint:

- Yue Xie, Zhongjian Wang and Zhiwen Zhang, *Randomized methods for computing optimal transport without regularization and their convergence analysis*, **arXiv preprint**, arXiv: 2212.07046, to appear in **Journal of Scientific Computing**.

Peer Reviewed Workshop Proceedings:

- Yue Xie, Zhongjian Wang and Zhiwen Zhang, *Random block coordinate descent methods for optimal transport and convergence analysis.* **Fortieth International Conference on Machine Learning (ICML) workshop on New Frontiers in Learning, Control, and Dynamical Systems**, Hawaii, 2023. Link to the article.
- Yue Xie and Stephen J. Wright, *Complexity of projected Newton methods for bound-constrained optimization.* **Thirty-seventh International Conference on Machine Learning (ICML) workshop: Beyond first order methods in machine learning systems**, Virtual, 2020. Link to the article.

Conference Paper Published (peer reviewed):

- Yue Xie and Uday V. Shanbhag, *SI-ADMM: A stochastic inexact ADMM framework for resolving structured stochastic convex programs.* **2016 Winter Simulation Conference (WSC)**, Washington, DC, 2016, pp. 714-725. https://doi.org/10.1109/WSC.2016.7822135.

- Yue Xie and Uday V. Shanbhag, *On robust solutions to uncertain monotone linear complementarity problems (LCPs) and their variants.* **53rd IEEE Annual Conference on Decision and Control (CDC)**, Los Angeles, CA, 2014, pp. 2834-2839. https://doi.org/10.1109/CDC.2014.7039824.

Submitted/Work in progress:

- Yue Xie, Jiawen Bi and Hongcheng Liu, Stochastic First-Order Methods with Non-smooth and Non-Euclidean Proximal Terms for Nonconvex High-Dimensional Stochastic Optimization. Submitted.
- Hanju Wu and Yue Xie, A study on generalized two-metric projection methods. Preliminary version has been peer-reviewed and accepted by 2024 INFORMS Optimization Society Conference.

Grant

1. Co-PI of Guangdong Province fundamental and applied fundamental research regional joint fund: optimization modeling method and large-scale application demonstration in automatic analysis and auxiliary diagnosis of medical endoscope images, Project number: 2022B1515130009, 2 million RMB.
2. HKU-IDS start-up fund, 1.16 million HKD.

Teaching Experience

University of Hong Kong — Hong Kong, China
DATA 8008: Scalable Optimization Methods in Data Science — **Spring 2024**
Teacher

University of Hong Kong — Hong Kong, China
ARIN 7600: Artificial Intelligence Capstone Project — **Fall 2023**
Mentor

University of Hong Kong — Hong Kong, China
IDSS 2301: Data Science for Beginners: Theory, Algorithms and Applications — **Summer 2023**
Teacher

University of Hong Kong — Hong Kong, China
ARIN 7011: Optimization in Artificial Intelligence — **Fall 2022**
Teacher

University of Wisconsin-Madison — Madison, WI, USA
CS/ISyE 730: Nonlinear Optimization II — **Spring 2020**
Guest Lecturer

Pennsylvania State University — State College, PA, USA
IE 425: Stochastic Models in Operations Research — **Spring 2018**
Teaching Assistant

Student/Postdoc/RA

1. Master of Philosophy: Hanju Wu (Undergraduate student in Math at Sun Yat-sen University, working on complexity of generalized two-metric projection methods.)
2. Research assistant: Jiawen Bi (Undergraduate student in Math at Zhejiang University.)
3. Research assistant: Farshad Golnary (Graduated with PhD degree at HKUST.)

Reviewer of Journals

SIAM Journal on Optimization (4), Mathematical Programming Series B (1), Mathematics of Operations Research (3), Journal of Scientific Computing (2), Mathematical Programming Computation (1), IMA Journal of Numerical Analysis (1), IEEE Transactions on Automatic Control (2), IEEE Transactions on Signal Processing (2), Journal of the Operations Research Society of China (1), IISE Transactions (1), Optimization Letters (2), Networks and Spatial Economics (2), Journal of Optimization Theory and Applications (1), Computational Optimization and Applications (1), Journal of Scientific Computing (1), Optimization (1).

Presentations

1. "Randomized methods for computing optimal transport without regularization and their convergence analysis", presentation delivered at University of Florida, Nov 2023.
2. "Constrained optimization: application, algorithm and complexity", presentation delivered at Institute of Data Science, the University of Hong Kong, June 2023.
3. "Complexity of projected Newton-CG methods for optimization with bounds", presentation delivered at Tongji University, May 2022.
4. "On addressing nonconvex problems in machine learning", presentation delivered in the Department of Mathematics and the Department of Industrial and Manufacturing Systems Engineering at the University of Hong Kong, Apr 2021.
5. "On Complexity of Constrained Nonconvex Optimization", presentation delivered in the Department of Applied Mathematics and Statistics at the Johns Hopkins University, Jan 2021.
6. "Complexity of augmented Lagrangian for nonconvex optimization with nonlinear constraints", presentation delivered at Institute for Operations Research and the Management Sciences (INFORMS) Annual Meeting, Virtual, Nov 2020.
7. "Complexity of projected Newton methods for bound-constrained optimization", presentation delivered at Thirty-seventh International Conference on Machine Learning (ICML) workshop: Beyond first order methods in machine learning systems, Virtual, July 2020. https://sites.google.com/view/optml-icml2020
8. "A tractable ADMM scheme for computing KKT points and local minimizers for ℓ_0-minimization problems", presentation delivered at International Conference on Continuous Optimization(ICCOPT), Berlin, Aug 2019.
9. "Stochastic ADMM frameworks for resolving structured stochastic convex programs", presentation delivered at Modeling and Optimization: Theory and Applications (MOPTA), Lehigh University, Aug 2018.
10. "Obtaining deterministic rates in stochastic ADMM schemes via a variable sample-size technique", presentation delivered at Institute for Operations Research and the Management Sciences (INFORMS) Optimization Society Conference, Denver, Mar 2018.
11. "SI-ADMM: A stochastic inexact ADMM framework for resolving structured stochastic convex programs", presentation delivered at Institute for Operations Research and the Management Sciences (INFORMS) Annual Meeting, Houston, Oct 2017.
12. "On the resolution of ℓ_0-norm minimization problems via alternating Lagrangian schemes", presentation delivered at Institute for Operations Research and the Management Sciences (INFORMS) Annual Meeting, Houston, Oct 2017.
13. "On the global resolution of ℓ_0-norm minimization problems via alternating Lagrangian schemes", presentation delivered at Society for Industrial and Applied Mathematics (SIAM) Conference on Optimization, Vancouver, BC, May 2017.
14. "SI-ADMM: A stochastic inexact ADMM framework for resolving structured stochastic convex programs", presentation delivered at 2016 Winter Simulation Conference (WSC), Washington, D.C., Dec 2016.
15. "On the resolution of complementarity formulations of the ℓ_0-norm minimization problem via ADMM schemes", presentation delivered at International Conference on Continuous Optimization (ICCOPT), Tokyo, Japan, Aug 2016.
16. "On an ADMM framework for the resolution of complementarity formulations of the ℓ_0-norm minimization problem: Preliminary work", presentation delivered at International Conference on Machine Learning (ICML) 2016 workshop on Optimization Methods for the Next Generation of Machine Learning, NY, June 2016.
17. "On robust solutions to uncertain linear complementarity problems and their variants", presentation delivered at Institute for Operations Research and the Management Sciences (INFORMS) Annual Meeting, Philadelphia, Nov 2015.
18. "On robust solutions to uncertain linear complementarity problems and their variants", presentation delivered at 22nd International Symposium on Mathematical Programming (ISMP), Pittsburgh, July 2015.
19. "On robust solutions to uncertain linear complementarity problems and their variants", presentation delivered at Modeling and Optimization: Theory and Applications (MOPTA), Lehigh University, Aug 2014.