Yue Xie, PhD

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

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, Zhongjian Wang and Zhiwen Zhang, *Randomized methods for computing optimal transport without regularization and their convergence analysis*, **Journal of Scientific Computing**, 100(37), 2024. https://link.springer.com/article/10.1007/s10915-024-02570-w.
- Yue Xie and Stephen J. Wright, *Complexity of a Projected Newton-CG Method for Optimization with Bounds*, **Mathematical Programming series A**, 207, pp.107-144, 2024. 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**, 86(38), 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**, 78, pp.43-85, 2021. 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, Jiawen Bi and Hongcheng Liu, *Stochastic First-Order Methods with Non-smooth and Non-Euclidean Proximal Terms for Nonconvex High-Dimensional Stochastic Optimization*, **arXiv preprint**, under second-round review of **Mathematical Programming**. https://arxiv.org/abs/2406.19475.

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):

- Hanju Wu and Yue Xie, A study on generalized two-metric projection methods. **2024 INFORMS Optimization Society Conference**, https://sites.google.com/view/ios2024refereed?usp=sharing (Submission # 5). ArXiv preprint, https://arxiv.org/abs/2409.05321.
- 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:

- Peter Chen, Yue Xie, Qingpeng Zhang, *SICNN: Sparsity-induced Input Convex Neural Network for Optimal Transport*. https://openreview.net/forum?id=iCLEUcDGUJ. (Accepted by Neurips workshop on Oct 9, 2024)

Grant

1. Hong Kong RGC General Research Fund (GRF), A study of algorithms and complexity to solve high-dimensional nonconvex optimization, Project number: 17300824, 683,973 HKD.
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, Fall 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: Peter Chen (Undergraduate student in Math and Computer Science at Columbia University.)
3. Research assistant: Enlong Shang (Undergraduate student in Math at Wuhan University.)
4. Research assistant: Jiawen Bi (Undergraduate student in Math at Zhejiang University. Current PhD student at the University of Minnesota Twin Cities)
5. Research assistant: Farshad Golnary (Graduated with PhD degree at HKUST. Current Postdoc at the University of New South Wales)

Skills

Programming: Proficiency in programming software Matlab. Experience with Minitab, R, Java, Python (including library numpy and others)

Writing: Latex

Language: Proficiency in English, Native speaker in Mandarin.

Reviewer of Journals

SIAM Journal on Optimization, Mathematical Programming, Mathematics of Operations Research, Journal of Machine Learning Research, Journal of Scientific Computing, Mathematical Programming Computation, IMA Journal of Numerical Analysis, IEEE Transactions on Automatic Control, IEEE Transactions on Signal Processing, Journal of the Operations Research Society of China, IISE Transactions, Optimization Letters, Networks and Spatial Economics, Journal of Optimization Theory and Applications, Computational Optimization and Applications, Optimization.

Selected presentations in the past five years

1. "On algorithm design for constrained optimization problems in machine learning", presentation delivered at Department of Mathematics, University of California Irvine, June 2024.
2. "Randomized methods for computing optimal transport without regularization and their convergence analysis", presentation delivered at Center for Applied Optimization, University of Florida, Nov 2023.
3. "Constrained optimization: application, algorithm and complexity", presentation delivered at Institute of Data Science, the University of Hong Kong, June 2023.
4. "Complexity of projected Newton-CG methods for optimization with bounds", presentation delivered at Tongji University, May 2022.
5. "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.
6. "On Complexity of Constrained Nonconvex Optimization", presentation delivered in the Department of Applied Mathematics and Statistics at the Johns Hopkins University, Jan 2021.
7. "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.
8. "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
9. "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.