Wei Kuang

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EDUCATION

The University of Chicago	Chicago, IL, USA
Ph.D. in Statistics, advised by Professor Mihai Anitescu	*September 2019 - June 2025 (expected)*
University of Science and Technology of China (USTC)	Hefei, Anhui, China
B.S. in Mathematics and Applied Mathematics	*September 2015 - July 2019*
Major: Probability and Statistics, GPA 3.96/4.30, Rank 1/46	

RESEARCH INTERESTS

Stochastic optimization, nonlinear optimization, randomized numerical linear algebra, online algorithms, uncertainty quantification, statistical inference in stochastic optimization methods

RESEARCH EXPERIENCE

Argonne National Laboratory — Lemont, IL, USA

Mathematics and Computer Science Division

- Research Aide Technical - PhD — Jun. - Sept. 2022, 2024
- Givens Associate — Jun. - Sept. 2023

PUBLICATIONS AND PREPRINTS

1. Online Covariance Matrix Estimation in Sketched Newton Methods

   Wei Kuang, Sen Na, and Mihai Anitescu

   Preprint, 2024   [Link]

   Preliminary results in *NeurIPS Workshop OPT 2023: Optimization for Machine Learning*, 2023   [Link]

   - We develop a consistent estimator for the limiting covariance matrix based on sketched Newton methods. Our estimator is recursively updated, batch-free, and requiring no Hessian inverse. We theoretically provide an upper bound on its convergence rate. Combined with asymptotic normality results, we can perform real-time statistical inference on model parameters.

2. Sequential quadratic programming method for inequality constrained stochastic optimization using only equality constrained subproblems

   Wei Kuang, Sen Na, and Mihai Anitescu

   Working paper

   - We aim to develop an online sequential quadratic programming method for stochastic optimization with both deterministic equality and inequality constraints. At each iteration, the method identifies an active set and then solves a subproblem involving only equality constraints, which significantly reduces the computational cost compared to methods that solve inequality constrained subproblems.

3. Compressed sensing for diffuse scattering

   Wei Kuang, Vishwas Rao, Alexis Montoison, François Pacaud, and Mihai Anitescu

   Working paper

   - We use compressed sensing to improve the resolution of a gigantic (size $500 \times 500 \times 500$) diffuse scattering data set. We apply a matrix-free interior point method to solve the compressed sensing problem, with Newton systems solved by preconditioned conjugate gradient (CG) method. We show that we can achieve "perfect" preconditioning on the neighborhood of the central path – the number of CG iterations is uniformly bounded on the central path and, as opposed to most experience with interior point – it does not degrade as the barrier parameter goes to infinity. We show a version of code that works on GPU.

HONORS AND AWARDS

1. Outstanding Graduate of Anhui Ordinary Institutions of Higher Learning — 2019
   - *the highest honor awarded to distinguished graduates among undergraduate students in Anhui Province*
2. School Outstanding Graduate in University of Science and Technology of China — 2019
3. 2018 S.-T. Yau College Mathematics Contests Individual Excellence Award in Probability and Statistics — 2018
   - *recognized as one of the fifteen finalists among all undergraduate participants across China*
4. 2018 S.-T. Yau College Mathematics Contests Team Excellence Award — 2018

5. Huang Yu Memorial Scholarship	2018
6. Gold Award of 2017 Outstanding Student Scholarship	2017
7. Gold Award of 2016 Outstanding Student Scholarship	2016

PRESENTATIONS

1. CELS student poster session, Argonne National Laboratory	Lemont, Aug. 2024
2. Student Research Poster Day, Department of Statistics, UChicago	Chicago, Feb. 2024
3. NeuRIPS workshop OPT 2023: Optimization for Machine Learning	New Orleans, Dec. 2023
4. Summer Student Mini-Symposium, Argonne National Laboratory	Lemont, Aug. 2022-2024

PROFESSIONAL SERVICE

Reviewer for

- NeuRIPS workshop OPT 2024: Optimization for Machine Learning   2024

TEACHING EXPERIENCE

Teaching Assistant, the University of Chicago

- STAT 27410 Introduction to Bayesian Data Analysis	Winter 2024
- STAT 33100 Sample Surveys	Autumn 2023, Autumn 2024
- STAT 34300 Applied Linear Statistical Methods	Autumn 2022
- STAT 34800 Modern Methods in Applied Statistics	Spring 2023, Spring 2021
- STAT 22000 Statistical Methods and Applications	Spring 2022, Autumn 2020
- STAT 20000 Elementary Statistics	Autumn 2021, Spring 2020
- STAT 20010 Elementary Statistics Through Case Study	Winter 2020

SKILLS

Programming Languages

- Julia, Matlab, R, Python, Mathematica

Languages

- Native: Mandarin; Proficient: English

REFERENCES

Provided upon request