Xiaoqian Liu

CONTACT INFORMATION

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RESEARCH INTERESTS

Methodology: Computational Statistics, Numerical Optimization, Statistical Machine Learning, Structured Estimation, Convex-Nonconvex Regularization, Robust Estimation

Application: Integrative Analysis of Multi-Omics Data, Transcriptome Deconvolution, Genetic Variation Annotation, Statistical Modeling for Tumor Heterogeneity and Evolution

PROFESSIONAL EXPERIENCE

University of California, Riverside, Riverside, CA

Tenure-track Assistant Professor 2024/07 – present

University of Texas MD Anderson Cancer Center, Houston, TX

Postdoctoral Fellow, Mentor: Wenyi Wang 2022/08 – 2024/06

Argonne National Laboratory, Lemont, IL

Research Aide, Supervisor: Stefan M. Wild 2021/08 – 2022/07
Wallace Givens Associate, Supervisor: Stefan M. Wild 2021/05 – 2021/08

EDUCATION

North Carolina State University, Raleigh, NC

Ph.D., Statistics, Advisor: Eric C. Chi 2018/08 – 2022/07

Renmin University of China, Beijing, China

M.S., Statistics, Advisor: Bo Zhang 2015/09 – 2018/06

China University of Mining and Technology, Xuzhou, China

B.S., Mathematics and Applied Mathematics 2011/08 – 2015/06

HONORS AND AWARDS

Best Poster Prize, 2023 SIAM Conference on Computational Science and Engineering 2023
UF Statistics 2023 Winter Workshop Travel Award, University of Florida 2023
2022 SDSS – Student & Early Career Travel Award, American Statistical Association 2022
Student Travel Award, North Carolina Chapter of the American Statistical Association 2020
National Scholarship for Graduate Students (Top 2%), Ministry of Education of China 2017
First Class Academic Scholarship of University, Renmin University of China 2015, 2016, 2017
National Scholarship for Undergraduates (Top 2%), Ministry of Education of China 2012, 2013, 2014

PUBLICATIONS

Note: the sign * at the beginning of a paper indicates alphabetical order of authorships; the sign † indicates co-first authorships; the sign ✉ denotes the corresponding author.

Peer-reviewed Publications

[1] **X. Liu** ✉, A. J. Molstad, and E. C. Chi. A Convex-Nonconvex Strategy for Grouped Variable Selection. *Electronic Journal of Statistics*, 17(2):2912-2961, 2023.

[2] **X. Liu** ✉, E. C. Chi, and K. L. Lange. A Sharper Computational Tool for L_2E Regression. *Technometrics*, 65(1):117-126, 2023. [**Invited to present in the Technometrics session at The 65th Annual Fall Technical Conference**].

[3] **X. Liu** ✉ and E. C. Chi. Revisiting Convexity-Preserving Signal Recovery with the Linearly Involved GMC Penalty. *Pattern Recognition Letters*, 156:60-66, 2022.

[4] **X. Liu** ✉, M. Vardhan, Q. Wen, A. Das, A. Randles, and E. C. Chi. An Interpretable Machine Learning Model to Classify Coronary Bifurcation Lesions. *The 43rd Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC)*, Oct. 31 – Nov. 4, 2021.

[5] B. Zhang and **X. Liu** ✉. Sparse Principal Component Analysis with Fused Penalty. *Statistical Research*, 36(4):119–128, 2019.

Pre-prints / Manuscripts

[6] **X. Liu** ✉, X. Han, E. C. Chi, and B. Nadler. A Majorization-Minimization Gauss-Newton Method for 1-Bit Matrix Completion. arXiv:22304.13940 [stat.ML]. Under Revision at *Journal of Computational and Graphical Statistics*.

[7] S. Guo†, **X. Liu**†, X. Cheng†, et al., and W. Wang ✉. DeMixSC: A Deconvolution Framework that Uses Single-Cell Sequencing Plus a Small Benchmark Dataset for Improved Analysis of Cell-Type Ratios in Complex Tissue Samples. Under Revision at *Genome Research.* bioRxiv 2023.10.10.561733. [**Best Poster Award at The 2023 Leading Edge of Cancer Research Symposium**].

[8] Y. Jiang†, M. D. Montierth†, K. Yu†, S. Ji, S. Guo, Q. Tran, **X. Liu**, et al., and W. Wang ✉. Pan-cancer Subclonal Mutation Analysis of 7,827 Tumors Predicts Clinical Outcome. Submitted. bioRxiv 2024.07.03.601939.

[9] Q. Heng†, **X. Liu**†, S. Ma, and E. C. Chi. Anderson Accelerated Operator Splitting Methods for Convex-Nonconvex Regularized Problems. *Manuscript Available upon Request.*

Working Papers

[10] * K. J. Dzahini, **X. Liu**, and S. M. Wild. Accelerating Randomized Adaptive Subspace Trust-Region Algorithms for Zeroth-Order Optimization.

[11] **X. Liu**, E. C. Chi, and K. L. Lange. Beyond Dykstra's Algorithm.

[12] **X. Liu**, H. Shi, H. Yan, E. Montellier, P. Hainaut, and W. Wang. Survival-based Clustering of Predictors in Cox Regression with an Application to *TP53* Mutation Annotation.

PRESENTATIONS AND TALKS

Invited Talks

[1] A Sharper Computational Tool for L_2E Regression. *The 65th Annual Fall Technical Conference. Oct. 5, 2023.*

[2] A Convex-Nonconvex Strategy for Grouped Variable Selection. *The 36th New England Statistics Symposium (NESS). June 6, 2023.*

[3] A Convex-Nonconvex Strategy for Grouped Variable Selection. *Computational and Methodological Statistics (CMStatistics) 2022. Dec. 19, 2022.*

[4] A Convex-Nonconvex Strategy for Grouped Variable Selection. *University of California, Los Angles (OpenMendel Group)*. Nov. 10, 2021.

Tutorials and Workshops

[5] A Tutorial on Boosting Methods. *Duke University (Randles Lab)*. Nov. 17, 2022.

[6] R for Data Science. *Biomedical Data Science Workshop & Careers Panel, UCLA. July 17, 2022.*

[7] A Tutorial on the CART Algorithm. *Duke University (Randles Lab)*. Nov. 9, 2021.

Contributed / Refereed Presentations

[8] Survival-based Clustering of Predictors in Cox Regression with an Application to *TP53* Mutation Annotation. *NCI Spring School on Algorithmic Cancer Biology (SSACB) 2024.* April 3, 2024.

[9] A Majorization-Minimization Gauss-Newton Method for 1-Bit Matrix Completion. *2023 Joint Statistical Meetings (JSM). Aug. 8, 2023.*

[10] A Convex-Nonconvex Strategy for Grouped Variable Selection. *Eastern North American Region (ENAR) 2023 Spring Meeting. Mar. 21, 2023.*

[11] A Convex-Nonconvex Strategy for Grouped Variable Selection. *2022 Symposium on Data Science & Statistics (SDSS)*. June 9, 2022.

[12] Randomized Projections in Derivative-Free Optimization. *Summer Argonne Student Symposium (SASSy) 2021*. July 30, 2021.

Poster Presentations

[13] Survival-based Clustering of Predictors in Cox Regression with an Application to *TP53* Mutation Annotation. *American Association for Cancer Research (AACR) Annual Meeting 2024.* April 8, 2024.

[14] Annotating *TP53* Germline Mutations from Patient Time-to-Cancer Diagnosis via Homogeneity Pursuit in Cox Regression. *The 2023 Leading Edge of Cancer Research Symposium. Nov. 16, 2023.*

[15] A Majorization-Minimization Gauss-Newton Method for 1-Bit Matrix Completion. *Statistical Foundations of Data Science and their Applications: A Conference in Celebration of Jianqing Fan's 60th Birthday. May 9, 2023.*

[16] A Majorization-Minimization Gauss-Newton Method for 1-Bit Matrix Completion. *UF Statistics 2023 Winter Workshop. Jan. 13, 2023.*

[17] An Interpretable Machine Learning Model to Classify Coronary Bifurcation Lesions. *The 43rd Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC)*. Oct. 31 – Nov. 4, 2021.

[18] Revisiting Convexity-Preserving Signal Recovery with the Linearly Involved GMC Penalty. *International Chinese Statistical Association (ICSA) 2020 Applied Statistics Symposium*. Dec. 14, 2020.

[19] Revisiting Convexity-Preserving Signal Recovery with the Linearly Involved GMC Penalty. *The 2020 Women in Statistics and Data Science (WSDS) Virtual Conference*. Oct. 1, 2020.

TEACHING EXPERIENCE

Rice University, Houston, TX

Guest Lecturer

- STAT423/623 (Probability in Bioinformatics and Genetics) Spring 2024
  Topic: Regularized Likelihood Models in Bioinformatics

North Carolina State University, Raleigh, NC

Teaching Assistant

- ST779 (Advanced Probability for Statistical Inference) Spring 2022
- ST517 (Applied Statistical Methods) Fall 2021
- ST370 (Probability and Statistics for Engineers) Fall 2018, Spring 2019, Fall 2019

Renmin University of China, Beijing, China

Teaching Assistant

- Time Series Analysis — Fall 2017
- Stochastic Analysis — Spring 2016

SOFTWARE

`MMGN`: R / MATLAB implementations of the MMGN method for 1-bit matrix completion.
`DeMixSC`: R implementation of the DeMixSC framework for bulk RNA-seq deconvolution.
`L2E`: R package for robust structured regression via the L_2 criterion.
`GMC`: R package for variable selection via a convex-nonconvex regularization strategy.

PROFESSIONAL SERVICES

Journal Reviewer

- Journal of Computational and Graphical Statistics
- Technometrics
- Journal of Statistical Computation and Simulation
- Communications in Statistics - Simulation and Computation
- Genetics
- PLOS Genetics

Student Mentor

- Haoming Shi, PhD student at Rice University
- Hao Yan, PhD student at UTHealth
- Lisa Lin, undergraduate at Rice University (now PhD student at Yale University)
- Arie Ogranovich, undergraduate at Rice University

Other Services

- Chair of the *High-dimensional, Multivariate, and Missing Data Methods* session at *ENAR 2023 Spring Meeting*.
- Judge for *ENAR 2023 Spring Meeting Poster Competition*.
- Chair of the *High-dimensional Statistics* session at *2022 Symposium on Data Science & Statistics*.

VOLUNTEER AND LEADERSHIP

Member, Stats Up AI Alliance — 2024/01 – present

- Work as a technical team member with cofounders to encourage and empower statisticians to fit in and embrace AI research.
- Build and maintain the website of Stats Up AI, including organizing data resources, collecting review articles from domain fields, and maintaining social media accounts.

Volunteer, Alternative Intercultural Service Break, NCSU — 2019/03 – 2019/03

- Worked as a volunteer with ABCCM in Black Mountain, NC, including homeless services, gardening, and environmental protection services.
- Visited and gave presentations at Black Mountain middle and elementary schools to introduce international cultures.

President, University Youth Volunteers Association, CUMT — 2013/06 – 2014/06

- Organized collaborative volunteer activities among local commonweal organizations in Xuzhou.
- Organized the inaugural University Volunteer Forum with five universities and colleges in Xuzhou.