Xiaoqian Liu

CONTACT INFORMATION

North Carolina State University
Department of Statistics

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RESEARCH INTERESTS

Numerical Optimization, Convex Analysis, Statistical Machine Learning, Non-convex Regularization, High-dimensional Data Analysis

EDUCATION

North Carolina State University, Raleigh, NC

Ph.D. candidate, Statistics, expected in 2022

- Thesis topic: *The GMC-type penalization methods*
- Adviser: Prof. Eric C. Chi
- Current GPA: $4.0/4.0$

Renmin University of China, Beijing, China

M.S., Statistics, July 2018

- Thesis: *Sparse principal component analysis with fused penalty*
- Adviser: Prof. Bo Zhang
- GPA: $3.96/4.0$

China University of Mining and Technology, Xuzhou, China

B.S., Mathematics and Applied Mathematics, June 2015

- *Cum Laude Graduate of University*
- GPA: $3.94/4.0$

REFEREED JOURNAL PUBLICATIONS

[1] **X. Liu**, and E. C. Chi. Revisiting Convexity-Preserving Signal Recovery with the Linearly Involved GMC Penalty. Under review.

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

REFEREED CONFERENCE PUBLICATIONS

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

WORKING PAPERS

[4] **X. Liu**, A. J. Molstad, and E. C. Chi. Linear Regression with Group GMC Penalization.

[5] **X. Liu**, D. Papp, and E. C. Chi. The GMC-type Penalized Least-Squares: Computation and Convex-Preservability.

PRESENTATIONS AND POSTERS

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

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

[3] Revisiting Convexity-Preserving Signal Recovery with the Linearly Involved GMC Penalty. In: *International Chinese Statistical Association (ICSA) 2020 Applied Statistics Symposium*, Dec.13 – 16, 2020. E-poster presentation.

[4] Revisiting Convexity-Preserving Signal Recovery with the Linearly Involved GMC Penalty. In: *Women in Statistics and Data Science Virtual Conference*, Sept.30 – Oct.2, 2020. E-poster presentation.

Research Experience

Argonne National Laboratory, Lemont, IL

Wallace Givens Associate May 2021 – Present

- **Randomized projections in nonlinear model-based optimization**
  Supervisor: Dr. Stefan M. Wild
  - Applied randomized projections on derivative-free optimization to improve the scalability for high-dimensional problems.
  - Proposed new strategies to adaptively set the subspace dimension to further accelerate the computation.

North Carolina State University, Raleigh, NC

Research Assistant Aug. 2021 – Present

- **MM algorithms for robust structured regression with the L_2 criterion**
  Supervisor: Prof. Eric C. Chi and Prof. Kenneth L. Lange
  - Implemented an MM algorithm to solve a family of robsut structured regression problem using the L_2 criterion.

Research Assistant Jan. 2021 – May. 2021

- **Gauss-Newton algorithm for nongative matrix factorization**
  Supervisor: Prof. Eric C. Chi and Prof. Boaz Nadler
  - Implemented the Gauss-Newton algorithm to box constrained least-squares problems and applied it on nonnegative matrix completion and factorization.

Research Assistant June 2020 – Aug. 2020

- **Nonnegative matrix factorization via an iterative least squares algorithm**
  Supervisor: Prof. Eric C. Chi and Prof. Boaz Nadler
  - Derived the rank 2r iterative least squares (R2RILS) algorithm for nonnegative matrix factorization and proposed using rank-1 updates to accelerate the convergence.

Research Assistant Jan. 2020 – Nov. 2020

- **R implementation of provable convex co-clustering of tensors**
  Supervisor: Prof. Eric C. Chi
  - Built an R package *CoCo* for convex co-clustering of tensors with C backend code to speed up computation.

Teaching Experience

North Carolina State University, Raleigh, NC

Teaching Assistant

- ST370 (Probability and Statistics for Engineers) Fall 2018, Spring 2019, Fall 2019
  - Undergraduate course on probability and statistics.
  - Graded and wrote solutions for quizzes, homework assignments and exams.
  - Held three office hours per week to answer questions and provide instruction on MATLAB programming.
- ST517 (Applied Statistical Methods) Fall 2021
  - Graduate course on data analysis methods and inference techniques.
  - Graded and wrote solutions for quizzes, homework assignments and exams.

Renmin University of China, Beijing, China

Teaching Assistant

- Stochastic Analysis Spring 2016
  - Graduate course on the theory of some frequently used stochastic processes.
  - Taught problem sessions and helped with preparation for class materials.

PROGRAMMING SKILLS	R, MATLAB, C, Python, SAS, C++
HONORS AND AWARDS	Student Travel Award, North Carolina Chapter of the American Statistical Association, 2020 Member of Mu Sigma Rho, National Statistics Honor Society, 2019 National Scholarship for Graduate Students , Ministry of Education of China, 2017 First Class Academic Scholarship of University, Renmin University of China, 2015 – 2017 National Scholarship for Undergraduates, Ministry of Education of China, 2012 – 2014
EXTRA-CURRICULAR	Volunteer of Alternative Intercultural Service Break, NCSU Mar. 9 – 17, 2019 - Worked as a volunteer with ABCCM in Black Mountain, NC, including homeless services, gardening and environmental protection services. - Visited and gave presentations in Black Mountain middle and elementary schools to introduce international cultures. President of the University Youth Volunteers Association, CUMT Jun. 2013 – Jun. 2014 - Organized collaborative volunteer activities among local commonweal organizations in Xuzhou. - Organized the inaugural University Volunteer Forum with five universities and colleges in Xuzhou.

Last updated on September 20, 2021