

# 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**, A. J. Molstad, and E. C. Chi. A Convex-Nonconvex Strategy for Grouped Variable Selection. Under review.
- [2] **X. Liu**, and E. C. Chi. Revisiting Convexity-Preserving Signal Recovery with the Linearly Involved GMC Penalty. Under review.
- [3] B. Zhang, and **X. Liu**. Sparse Principal Component Analysis with Fused Penalty (in Chinese). *Statistical Research*, 36(4):119–128, 2019.

## REFEREED CONFERENCE PUBLICATIONS

- [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. 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

- [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 robust structured regression problem using the  $L_2$  criterion.

*Research Assistant*

Jan. 2021 – May. 2021

• **Gauss-Newton algorithm for nonnegative 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*

• 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.

• 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.

**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	<p>Student Travel Award, North Carolina Chapter of the American Statistical Association, 2020</p> <p>Member of Mu Sigma Rho, National Statistics Honor Society, 2019</p> <p>National Scholarship for Graduate Students , Ministry of Education of China, 2017</p> <p>First Class Academic Scholarship of University, Renmin University of China, 2015 – 2017</p> <p>National Scholarship for Undergraduates, Ministry of Education of China, 2012 – 2014</p>
EXTRA-CURRICULAR	<p>Volunteer of Alternative Intercultural Service Break, NCSU Mar. 9 – 17, 2019</p> <ul style="list-style-type: none"> <li>- Worked as a volunteer with ABCCM in Black Mountain, NC, including homeless services, gardening and environmental protection services.</li> <li>- Visited and gave presentations in Black Mountain middle and elementary schools to introduce international cultures.</li> </ul> <p>President of the University Youth Volunteers Association, CUMT Jun. 2013 – Jun. 2014</p> <ul style="list-style-type: none"> <li>- Organized collaborative volunteer activities among local commonweal organizations in Xuzhou.</li> <li>- Organized the inaugural University Volunteer Forum with five universities and colleges in Xuzhou.</li> </ul>