Guixian Chen (+1) 734-730-1959 | gxchen@umich.edu

EDUCATION

University of Michigan, Ann Arbor

Ph.D. of Industrial and Operations Engineering

University of Michigan, Ann Arbor Master of Statistics

Peking University **Bachelor** of Mathematics

Research

Robust Low-rank Covariance Matrix Estimation

Supervisor: Assistant Professor Salar Fattahi, Ph.D.

- Develop a robust, efficient and easy-to-implement covariance matrix estimation algorithm under the adversarial contamination model, achieving the sub-optimal rate of accuracy.
- Establish a rank search approach based on incremental learning.
- Extend the algorithm to the de-centralized setting, showing its robustness against Byzantine attacks.
- Implement and compare our algorithm and other competitive covariance estimation estimation algorithms under different corruption patterns and heavy-tailed distributions.

MASTER THESIS

Distributed Statistical Learning

Collaborators: Yumeng Wang, Ziwei Zhu, Yichen Zhang

- Develop the one-step Newton's type distributed learning algorithm to improve the communication efficiency while keeping the statistical efficiency based on existing distributed one-step approach.
- Prove the mean square error bound of our averaging Newton estimator theoretically and introduce the ridge penalty to local Hessian Matrix in order to stabilize the performance of estimator numerically.
- Extend the one-step distributed algorithm to multi-step scenario and mathematically prove the convergence rate, as well as introduce subsampling technique to further sharpen the rate.
- Establish Newton's type distributed algorithm in high-dimensional context based on debiasing strategy so as to boost generality of the algorithm.
- Implement and compare our estimator and other competitive distributed estimators under multiple settings, which shows the superiority of our estimator.

UNDERGRADUATE THESIS

Numerical Methods for Fractional Laplacian

Supervisor: Assistant Professor Shuonan Wu, Ph.D.

- This paper is a literature review about a special class of Fractional Laplace equation and corresponding numerical methods, where the fractional order Poisson problem over a finite region is studied.
- This paper uses three different numerical methods to solve the research problem and discusses them from different perspectives such as algorithm implementation and error estimation.
- The numerical experimental part of the paper mainly examines the one-dimensional case of the research problem and provides preliminary measurements of the error and convergence rate of each numerical method.

Awards

- Scholarship of YiZheng Alumni, School of Mathematical Sciences, Peking University, Sept. 2018 June. 2019
- Gold medal of the 32nd Chinese Mathematical Olympiad (CMO), Nov. 2016

SKILLS

Languages: $Python \cdot Matlab \cdot R \cdot Bash \cdot Git \cdot IAT_FX$

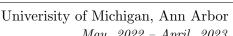
Frameworks: PyTorch · Tensorflow · Keras · NumPy · pandas · SciPy · scikit-learn · CVX · Gurobi · Mosek

Ann Arbor, Michigan Aug. 2023 - Present

Ann Arbor, Michigan Aug. 2021 - April. 2023

Beijing, China Sept. 2017 - June. 2021

Aug. 2023 – present



University of Michigan, Ann Arbor

May. 2022 - April. 2023

Peking University Feb. 2021 - June. 2021