WANTENG MA

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EDUCATION

The Hong Kong University of Science and Technology *2021 - 2024*
M.Phil in Mathematics GPA: 4.155/4.3
Selected coursework: Advanced Mathematical Statistics (A+), Advanced Numerical Methods (A+), Advanced Probability Theory II (A+), Optimization for Machine Learning (A+), Reading Course: High-dimensional Probability and Statistics (A+)

Zhejiang University, *Chu Kochen Honors College* *2017 - 2021*
B.S. in Statistics (with honors) GPA: 3.94/4.0
B.B.A. in Management Information Systems
Ranking: Top 2% (1/64)
Selected coursework: Mathematical Statistics (A+), Stochastic Process (A+), Real Analysis (A+), Multivariate Statistical Analysis (A+), Applied Operations Research (A+), Combinatorial Optimization (A), Time Series (A)

PUBLICATIONS AND MANUSCRIPTS

[1]: Optimal Regularized Online Allocation by Adaptive Re-Solving. [pdf]
Wanteng Ma, Ying Cao, Danny H.K. Tsang, and Dong Xia.
Under **minor** revision at *Operations Research*

[2]: Multiple Testing of Linear Forms for Noisy Matrix Completion.
Wanteng Ma, Lilun Du, Dong Xia, and Ming Yuan.
Available upon request

[3]: High-dimensional Linear Bandits with Knapsacks. [pdf]
Wanteng Ma, Dong Xia, and Jiashuo Jiang.
A short version submitted to the 41st International Conference on Machine Learning (ICML 2024)

RESEARCH PROJECTS

My research mainly focuses on two topics: (i) high-dimensional inference, (ii) online allocation.

(i) High-dimensional Statistical Inference

FDR Control for Multiple Testing in Noisy Matrix Completion *Jul 2022 - present*
Advisors: Prof. Dong Xia, Prof. Ming Yuan, Prof. Lilun Du

- Studied a novel problem of testing multiple linear forms for noisy matrix completion (e.g., testing multiple entries of a matrix), which is challenging due to the subtle *bias-and-variance tradeoff* and *intricate unknown dependence* among the estimated entries.
- Introduced new statistics with sharp asymptotics and utilized them to control the FDR via a data splitting and symmetric aggregation scheme.
- Achieved valid FDR control with guaranteed power under nearly optimal sample size requirements.

Statistical Inference of Linear Forms in Tensor Model *Oct 2023- present*
Advisor: Prof. Dong Xia

- Studied the statistical inference of linear forms in tensor problems, including tensor PCA and noisy tensor completion models.

- Quantified the uncertainty of inferring a linear form precisely by the projection of the linear combination onto the tangent space of the Riemannian manifold, which coincides with our previous findings in the matrix setting.
- Obtained asymptotic normal statistics without debiasing since the computational SNR lower bound for tensor estimation is strong enough to make the bias negligible.

Conformalized Link Prediction with FDR Control in Graph Model *Aug 2023- present*
Advisors: Prof. Dong Xia, Prof. Yuan Zhang, Prof. Wen Zhou

- Studied FDR control in the conformalized link prediction model with randomized missing links.
- Performed a kernel-based method on the train set to obtain non-conformity score functions and applied them to construct valid e-values on the calibration set.
- Controlled the FDR with unknown missing probabilities by leveraging exchangeability and e-values.

(ii) Online Resource Allocation

Optimal Regularized Online Allocation by Adaptive Re-Solving *Jan 2022 - Sept 2022*
Advisors: Prof. Dong Xia, Prof. Danny H.K. Tsang

- Proposed a dual-based algorithm framework that can *optimally* and *efficiently* solve the regularized online allocation problem, which features hard resource constraints and a non-separable regularizer.
- The framework only requests approximate solutions to the empirical dual problems and yet delivers an optimal $O(\log T)$ regret. The resolving can be reduced to $O(\log T)$ times.
- Provided a worst-case $\Omega(\sqrt{T})$ lower bound if the resource constraints are not adaptively updated, which stresses the importance of adaptiveness.

High-dimensional Linear Bandits with Knapsacks *Jul 2023 - present*
Advisors: Prof. Dong Xia, Prof. Jiashuo Jiang

- Studied the contextual bandits with knapsacks under a high-dimensional setting and achieved improved regret that depends logarithmically on the dimension.
- Developed an online hard-thresholding algorithm that performs the sparse estimation in an *optimal* and *fully online* manner, which is comparable with LASSO but requires fewer computations.
- Applied the algorithm to the high-dimension bandit problem and achieved optimal regret in both the data-poor and data-rich regimes.

PROGRAMMING SKILLS

Proficient at: Matlab, R, Python, PyTorch
Familiar with: C, Java, SQL

AWARDS AND SCHOLARSHIPS

RedBird Award, HKUST *2021*
Hong Kong PhD Fellowship, Research Grants Council of HK *2021*
Top 300 among all the PhD students in Hong Kong
Outstanding Graduate, Zhejiang University *2021*
National Scholarship, Ministry of Education of the P.R.C. *2019*
Top 1% among all the students in the Chu Kochen Honors College
Scholarship for Excellence, CKC College, Zhejiang University *2019*
Top 5% among all the students in the Chu Kochen Honors College
First Prize in The Chinese Mathematics Competitions, Zhejiang Mathematical Society *2019*

Meritorious Winner in Mathematical Contest In Modeling, COMAP *2019*
Top 6% among all the participants in the contest
First-Class Scholarship for Outstanding Students, Zhejiang University *2018,2019*
Top 10% among all the students in the Chu Kochen Honors College

TEACHING EXPERIENCE

TA in the Hong Kong University of Science and Technology:
MATH 1013 - Calculus IB *2023 Fall*
MATH 3424 - Regression Analysis *2023 Spring*
MATH 4424 - Multivariate Analysis *2022 Fall*
MATH 2411 - Applied Statistics *2022 Spring*

ACADEMIC ACTIVITIES

Conference presentations:

- **14th POMS-HK International Conference**
  HKUST, Hong Kong SAR *Jan 5-6, 2024*

Other attended conferences:

- **The 12th ICSA International Conference**
  Chinese University of Hong Kong, Hong Kong SAR *Jul 7-9, 2023*
- **International Conference on Applied Mathematics 2023**
  City University of Hong Kong, Hong Kong SAR *May 30-Jun 03, 2023*
- **2022 IMS International Conference on Statistics and Data Science (ICSDS)**
  Florence, Italy *Dec 13-16, 2022*
- **The 11th ICSA International Conference**
  Hangzhou, China *Dec 20-22, 2019*