

Jialin (Mark) YU

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EDUCATION

SHANGHAITECH UNIVERSITY, Shanghai, China

Sep. 2020 - Expected Jun. 2024

Bachelor of Science Candidate, Mathematics and Applied Mathematics

- GPA (Comprehensive) 3.87/4.0 | GPA (Major): 4.0/4.0, Rank (Major): 2/15 GPA | (Last 2 semesters): 3.95/4.0
- Convex optimization, Functional analysis, Stochastic process

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, MA

Sep. 2022 – Jan. 2023

Special Student Program (Exchange Program)

- GPA 5.0/5.0
- Courses: 6.7210 Introduction to Mathematical Programming, 18.404 Theory of Computation, 6.1220 Design and Analysis of Algorithms

RESEARCH INTEREST

Theoretical computer science, robust estimation, high-dimensional statistics, and algorithm design.

EXPERIENCE

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, MA

Independent Researcher | PI: Prof. Patrick Jaillet; PhD Student Advisor: Moïse Blanchard Dec. 2022 – April. 2024

- Goal: Designing a memory-constrained & efficient algorithm to optimize a class of functions given in a paper (*Efficient Convex Optimization Requires Superlinear Memory*, Marsden et al).
- Analyzed the properties of the function class by innovatively using the theory in Chapter 2.7 of Terence Tao's book *Topics in Random Matrix Theory* to lowerbound the least singular value. The projection algorithm is proved to be converging efficiently based on this theorem. By further analysis, properties of the optimal solution as well as that of the objective value are established. A fast access to approach all gradients within N iterations is proposed to alleviate the constraint on memory.
- Partial results: The projection algorithm. Properties of the function class given in Marsden et al. Algorithm for the relaxed case. Fast access to all gradients within N iterations.

SHANGHAITECH UNIVERSITY, Shanghai, China

Undergraduate Researcher | PI: Prof. Ziping Zhao

Jun. 2023 – Present

- Goal: Proposing a formulation for the robust large covariance estimation under unknown sparsity pattern and proving its statistical convergence rate, which matches the minimax optimal rate.
- Proposed a formulation with robust loss and l^1 penalty for robust large covariance estimation under unknown sparsity pattern. Using advanced statistical treatments like Bernstein's inequality in probability estimation. Referred to methods proposed in Robust regression and unrobust covariance estimation.
- Preparing a paper on findings of research as first author for publication.
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Teaching Assistant, Courses: Mathematical Analysis I (GEMA1009) & II (GEMA1010)

Sep. 2021 – Jul. 2022

- Tutored 40 students weekly; graded assignments and quizzes; communicated between students and professors.

ACTIVITIES

SHANGHAITECH UNIVERSITY, Shanghai, China

Participant, Real Analysis discussion session, Shanghai, China

Feb. 2022 – May, 2022

- Talked about content including Fubini's Theorem with reference to Stein's Real Analysis; see [link](#).

Volunteer, Social Practice Project, Liupanshui City, Guizhou Province, China

Jul. 2021

- Produced an assessment report with student team on local Chinese herbal medicine industry by reviewing economic and business statistics and visiting agricultural production factories.
- Investigated personal impact of inhabitants' relocation by conducting interviews, and proposed improvements.

Member, Physics Club, Shanghai, China

Sep. 2020 – Present

- Studied the intersection of math and physics. Visited Shanghai Astronomical Observatory of the Chinese Academy of Sciences to learn about state-of-the-art scientific facilities and astronomical discoveries.

Volunteer for Shanghai Marathon, Shanghai, China

Apr. 2021

- Provided route guidance and maintained order for event with 38,000 runners.

INDEPENDENT TUTOR, Shanghai, China

Jan. 2021 – Feb. 2021

- Tutored elementary physics to a high school student three times a week.

SKILLS AND AWARDS

- Languages: Chinese (Native), English (Fluent), TOEFL: Total: 102: R:30 / L:26 / S:22 / W:24
- Computer Skills: Python, MATLAB, Julia, Lyx
- **Bronze Medal** in the 36th national Physics Olympiad, as member of finalist team from Liaoning Province, Oct. 2019
- **First-class certification** awarded by Peking University Physics Summer Camp, Aug. 2019
- Hobbies: Piano, Go enthusiast, jogger