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, Introduction to functional analysis, Stochastic process

MASSACHUSETTS INSTITUTE OF SCIENCE AND 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 machine learning, high-dimensional statistics, and algorithm design and their application in industrial engineering and operations research.

EXPERIENCE

MASSACHUSETTS INSTITUTE OF SCIENCE AND TECHNOLOGY, Cambridge, MA

Independent Researcher | PI: Prof. Patrick Jaillet; PhD Student Advisor: Moïse Blanchard   *Dec. 2022 - Present*
- Objective: 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.
- Using the projection algorithm I first constructed as a repeatedly invoked subroutine in the final algorithm.
- Stationary 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, Data Science and Intelligence Lab | PI: Prof. Ziping Zhao   *Jun. 2023 – Present*
- Objective: 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.

Course Research, CS182 Introduction to Machine Learning   *May 2023*
- Objective: Learning and implementing state-of-the-art robust covariance estimators designed for elliptical and heavy-tailed distributions. Constructing the accuracy score measurement to show a phenomenon on the drawback of l^∞ measurement.
- The phenomenon was observed when testing some advanced robust covariance estimators with Python.

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

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.

Industry Practice Project*, Shanghai, China* ***Jul. 2022***
- Visited labs and facilities such as at United Imaging Healthcare to study the impact and multidisciplinary approach of the medical software industry in Shanghai, such as the application of AI to diagnose tumors and the use of robotics for the rehabilitation of disabled people to use their arms and legs.

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