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

Continuous optimization, robust estimation, high-dimensional statistics, and algorithm design and their applications.

EXPERIENCE

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, MA

Independent Researcher | PI: Prof. Patrick Jaillet;   PhD Student Advisor: Moïse Blanchard   *Dec. 2022 - Present*
- 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).
- Constructed and proved an efficient memory-constrained projection algorithm. 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. Established properties of the optimal solution as well as that of the objective value. Proposed a fast access to approach all gradients within N iterations 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, Data Science and Intelligence Lab | 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.

Course Research, CS182 Introduction to Machine Learning   *May 2023*
- Goal: 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.

Course Research, ECON1305 Game Theory   *May 2023*
- Proposed a model for the Game of Learning and Course setting in college. Used the model for prediction of grades.

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.

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 General Physics to a high school student three times a week.

SKILLS AND AWARDS

- Languages: Chinese (Native), English (Fluent), TOEFL: Total: 105: R:29 / L:30 / 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