Yujia Zhang

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Education

Cornell University, Center for Applied Mathematics Ithaca, NY
Ph.D. in Applied Mathematics Expected May 2024

Cornell University, College of Arts and Sciences Ithaca, NY
B.A. with Distinction in All Subjects, GPA: 4.074/4.3 August 2015-May 2019
Magna cum laude in Mathematics, German Studies; Minor in Physics

Research Interests

Mathematical modeling, Bayesian optimization, Machine learning, Reinforcement learning

Publications

1. P.I. Frazier, J.M. Cashore, N. Duan, S.G. Henderson, A. Janmohamed, B. Liu, D.B. Shmoys, J. Wan, Y. Zhang, "Modeling for COVID-19 College Reopening Decisions: Cornell, A Case Study" [Link]. To appear in *Proceedings of the National Academy of Sciences*.
2. J. Wan, Y. Zhang, P.I. Frazier, "Correlation Improves Group Testing" [Link].
3. Y. Lin, Y. Ren, J. Wan, J.M. Cashore, J. Wan, Y. Zhang, P.I. Frazier, E. Zhou, "Group Testing Enables Asymptomatic Screening for COVID-19 Mitigation: Feasibility and Optimal Pool Size Selection with Dilution Effects" [Link]. In revision.
4. Y. Zhang, K. Song, Y. Sun, S. Tan, M. Udell, "'Why Should You Trust My Explanation?' Understanding Uncertainty in LIME Explanations" [Link]. ICML 2019 Workshop on AI for Social Good.
5. Ruch, Y. Zhang, M. Macy, "Demographic Confounding Causes Extreme Instances of Lifestyle Politics" [Link].

Experience

COVID-19 Modeling May 2020 – Present

- Supported Cornell University to safely conduct in-person instruction amid the pandemic since Fall 2020. The average daily incidence rate was 0.01% in the 2020-21 academic year among 34K students, faculty, and staff.
- Developed Python simulation to predict epidemiological outcomes on campus, which was the basis for the decision to reopen the campus in Fall 2020.
- Worked with the President, Provost, and Director of Cornell Health to decide on pandemic interventions.
- Quantified uncertainty of model parameters though sensitivity analysis, model calibration, and Bayesian inference, using SQL to acquire data.
- Conducted social network analysis to support in-time targeted testing of student communities at risk.
- Constructed a mathematical model of droplet transmission that informed distancing, masking, and ventilation requirements in classrooms.
- Trained a machine learning classifier to predict an individual's risk of infection.
- Documented and visualized modeling outcomes to effectively communicate with non-technical stakeholders.
- See the full collection of modeling reports since May 2020 and press coverage in Wall Street Journal, Forbes, ABC News, Good Morning America, Cornell Engineering Spotlights, and Cornell Chronicle.

Deconfounding the Measurement of Lifestyle Politics July 2019 – November 2019

- Analyzed a dataset of 137 million observations on 300,000 Facebook interests aggregated across user groups of different political and demographic characteristics.
- Developed a novel metric for the political alignment of an interest that adjusts for demographic confounding.

Presentations

1. "Calculation and Estimation of the Basic Reproduction Number". Applied Dynamics Seminar, virtual, June 2020.
2. "Parameter Estimation for ODE Models". Applied Dynamics Seminar, virtual, November 2020.

3. "COVID-19 Modeling for Cornell's Fall Semester". Center for Applied Math Poster Session, virtual, September 2020.
4. "COVID-19 Modeling for Cornell's Fall Semester". ORIE 1370 Data Science for All, May 2021.
5. "Fighting COVID-19 at Cornell". Cornell ORIE ORACL (OR Advances through Collaboration) Workshop, November 2021.

Teaching

Summer Program for Undergraduate Research, Dept. of Mathematics Ithaca, NY
Graduate Assistant Summer 2020
- Assisted Dr. Andy Borum in supervising undergraduate research projects in optimal control

Cornell University Department of Mathematics Ithaca, NY
Course Assistant, Tutor, and Grader Spring, Summer and Fall 2017, Spring 2018 and 2019
- Tutor at Cornell Math Support Center, drop-in help for undergraduate math classes at all levels
- Grader for Calculus I, Multivariable Calculus, and Finite Mathematics

Cornell University Department of Physics, Cornell University Ithaca, NY
Undergraduate Teaching Assistant Spring 2016, Fall 2016
- Tutor for Mechanics and Electricity and Magnetism

Service and Outreach

Math Explorer's Club Ithaca, NY
Co-organized with Mallory Gaspard March - November 2020
- Designed and led in-person and online sessions aimed at introducing topics in applied math to local middle school and high school students (grades 6-12)
- Topics included population dynamics, random walk, PageRank algorithm, optimal control and path planning

Judge for Cornell Mathematical Contest in Modeling Ithaca, NY
November 2019 and November 2021
- Reviewed undergraduate students' mathematical modeling reports

Awards and Honors

Dean's List, College of Arts and Sciences, Cornell University All semesters
Phi Beta Kappa April 2018
Cornell Mathematical Contest in Modeling, Second Place November 2018
COMAP Mathematical Contest in Modeling, Meritorious February 2018
Cornell Graduate School Fellowship Academic Year 2019-2020

Skills

Software: Python (including Pandas, Scikit-learn, PyTorch), R, MATLAB, SQL.
Languages: Mandarin (Native), German (Fluent), French (Elementary).