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, Epidemiology.

Experience

Research Intern, *Theorem Partners LLC* May 2023 – Aug. 2023
- Trained and validated models in LightGBM to predict a loan application's approval and assigned interest rate.
- Converted prototyped models to XML-based representations to productionize for a new marketing channel.
- Analyzed A/B testing data to study the effect of varying a consumer loan's interest rate on origination probability.

Research Engineering Intern, *Meta, Adaptive Experimentation* May 2022 – Jan. 2023
- Conducted research on efficient Bayesian optimization using preference elicitation over high-dimensional outputs.
- Developed representation learning methodology based on autoencoders and PCA using PyTorch.
- Validated the proposed method on online experimentation and time series problems.

COVID-19 Modeling, *supporting Cornell's reopening since Fall 2020* May 2020 – Jan. 2022
- Quantitative Analyses:
  - Developed Python simulation to predict epidemiological outcomes on campus under various interventions.
  - Quantified parameter uncertainty though sensitivity analysis, model calibration, and Bayesian inference.
  - Built a mathematical model of droplet transmission to advise interventions for fully in-person instruction.
  - Developed causal inference models to quantify the safety of in-person instruction based on Fall 2021 data.
  - Studied how correlated viral samples affect pooled testing using probability theory and network simulation.
- Communication:
  - Worked with the President, Provost, and Director of Cornell Health to decide on interventions, communicating effectively through documenting and visualizing modeling outcomes.
  - 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 299,327 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.

Papers Published or In Review

1. Y. Zhang, J. Markovic, J. Lin, Q. Feng, P. I. Frazier, E. Bakshy, "Preference Exploration in Low-rank Subspace for Bayesian Optimization with Many Outcomes".
2. 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] 119(2), *Proceedings of the National Academy of Sciences*, 2022.
3. J. Wan, Y. Zhang, P.I. Frazier, "Correlation Improves Group Testing" [Link]. Under major revision at *Management Science*.
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].

Papers in Preparation

6. 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].
7. B. Liu, Y. Zhang, S.G. Henderson, D.B. Shmoys, P.I. Frazier, "Modeling the Risk of In-Person Instruction During the COVID-19 Pandemic".
8. V. Gande, A. Michuda, Y. Zhang, S.G. Henderson, D.B. Shmoys, P.I. Frazier, "Transmission of COVID-19 in Classrooms: A Retrospective Cohort Study."

Presentations

1. "Calculation and Estimation of the Basic Reproduction Number". Applied Dynamics Seminar, virtual, June 2020.
2. "COVID-19 Modeling for Cornell's Fall Semester". Center for Applied Math Poster Session, virtual, September 2020.
3. "Parameter Estimation for ODE Models". Applied Dynamics Seminar, virtual, November 2020.
4. "COVID-19 Modeling for Cornell's Fall Semester". ORIE 6125 Computational Methods in Operations Research, February 2021.
5. "COVID-19 Modeling for Cornell's Fall Semester". ORIE 1370 Data Science for All, May 2021.
6. "Fighting COVID-19 at Cornell". Cornell ORIE ORACL (OR Advances through Collaboration) Workshop, November 2021.
7. "Correlation Improves Group Testing". INFORMS 2022 Annual Meeting, October 2022.

Teaching

ORIE 6500: Applied Stochastic Processes Ithaca, NY
Teaching Assistant Fall 2022
- Assisted Prof. Ziv Scully in teaching recitations, grading assignments, and holding office hours.

MATH 3610: Mathematical Modeling Ithaca, NY
Teaching Assistant Fall 2022
- Assisted Prof. Alex Vladimirsky in grading assignments and projects and holding office hours.

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

Reviewer for AAAI 2023, AISTATS 2023, AutoML 2023

Cornell Mathematical Contest in Modeling Ithaca, NY
Judge November 2019, 2021, 2022
- Reviewed undergraduate students' mathematical modeling reports

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

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