Qian Zhao

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EDUCATION

Postdoctoral Scholar	Biomedical Data Science, Stanford University	2022-Present
Ph.D.	Statistics, Stanford University	2021
M.S.	Statistics, The University of Chicago	2016
B.S.	Physics, Fudan University, Shanghai, China	2014

RESEARCH INTERESTS

High-dimensional statistical inference, Statistical genetics, Nonparametric density estimation, Data science education

RESEARCH

Postdoctoral researcher, Stanford University
Selecting genetic variants under sampling bias

Advisor: Prof. Chiara Sabatti, Collaborator: Susan Service 2022-Present

Apply, develop, and evaluate statistical methods to identify genetic variants associated with endophenotypes to understand distinct and common genetic variants that affects severe mental disorders.

Graduate researcher, Stanford University:
Inferring coefficients of a high-dimensional Generalized Linear Model (GLM)

Advisor: Prof. Emmanuel Candès 2017-Present

Developed theories and methods to estimate the distribution of the maximum likelihood estimates (MLE) of a high-dimensional GLM as the number of variables grows with the number of observations.

Constructing a moderate- to high-dimensional histogram

Advisor: Prof. Guenther Walther 2017-Present

We developed a Beta-tree histogram for moderate- to high-dimensional data and provide confidence intervals for the average density in each region.

Technical Mentor, Data Science for Social Good, Stanford University:
Identifying behavioral health conditions from police records

Advisor: Dr. Balasubramanian Narasimhan, Collaborator: Lisa Pickoff-White Summer 2022

We developed a data analysis pipeline to identify police records that mentions behavioral health conditions and output relevant information.

Operationalizing equity tiebreaker in San Francisco student school assignment

Advisor: Prof. Irene Lo, Project partner: San Francisco Unified School District Summer 2021

We developed an equity tiebreaker and evaluated its effect on enhancing equity in elementary student assignment. We presented our work at the Ad hoc committee meeting on student assignment at San Francisco Unified School District.

Fellow, Data Science for Social Good, Stanford University
Forecasting platelet blood bag demand to reduce inventory wastage at the Stanford Blood Center

Advisor: Prof. Chiara Sabatti and Dr. Balasubramanian Narasimhan, Collaborator: Dr. Tho Pham Summer 2019

We predicted platelet blood bag demand by combining surgery information and recurring transfusion data.

PUBLICATIONS

Manuscript and preprints

Sabatti, C. & **Zhao, Q.** (2022 in preparation) Near-peer mentoring in data science: Two experiences at Stanford University

Zhao, Q. (2022) Growing by Mentoring: A guide for Data Science for Social Good mentors

Walther, G. & **Zhao, Q.** (2022 in preparation) Beta-trees: Multivariate histograms with confidence statements

Zhao, Q. & Candes, E. (2022 under review). An adaptively resized parametric bootstrap for inference in high-dimensional generalized linear models, *arXiv 2208.08944*

Peer reviewed articles

Zhao, Q., Sur, P. & Candes, E. (2022). The asymptotic distribution of the MLE in high-dimensional logistic models: Arbitrary covariance. *Bernoulli* 28 (3)

Zhu, J., **Zhao, Q**., Katsevich, E. & Sabatti, C. (2019). Exploratory gene ontology analysis with interactive visualization. *Sci Rep* 9, 7793

Orlova, D.Y., Meehan, S., Parks, D., **Zhao, Q.** et al. (2018) QFMatch: Multidimensional flow and mass cytometry samples alignment. *Sci Rep* 8, 3291

Presentations

Zhao, Q., "Writing a reproducible manuscript in R." (Lightning talk) *Gear-up for Science Data Symposium*, Stanford University, Stanford, CA, 2022

Zhao, Q., Guthrie, E. & King, C. "Forecasting platelet blood bag demand to reduce inventory wastage at the Stanford Blood Center." (Presentation) *RStudio Conference*, San Francisco, CA, 2020

TEACHING & MENTORING

Technical Mentor, Data Science for Social Good, Stanford University Summer 2021, 2022

- Stanford Data Science for Social Good is a summer program where fellows tackle data science projects with positive social impact during a course of eight weeks.
- Collaborated with community partners to formulate project goals, approaches, and milestones.
- Facilitated daily meetings where I guided fellows to brainstorm ideas, discuss different approaches, share progress, and provide feedback on each other's work.
- Advised project work, presentations, and final report, where I asked for clarifying information, answered questions, suggested related research or approaches.
- Held working session with fellows and invited graduate students to speak on related data science topics.
- Met with fellows to discuss individual goals and provide relevant resources.
- Taught training sessions on multiple hypotheses testing, using Git for collaboration, and topic modelling.

Teaching Assistant, Stanford University: 2016-2021

Undergraduate level courses

"Biostatistics," introductory course in statistical methods for biological data (t-test, categorical data analysis, linear regression), Winter 2021, Fall 2019

"Statistical methods in engineering and the physical sciences," introductory course in probability and statistical methods for undergraduates majoring in physical science and engineering, Fall 2020, Spring 2018

"Introduction to statistical methods," introductory course in statistics for undergraduate and high school students (data summary and visualization, sampling, hypothesis testing, modelling continuous and categorical relationships), Summer 2020

"Data science 101," undergraduate course in statistics (data visualization, sampling and resampling, linear models, hypothesis tests), Spring 2020

"Riding the data wave," freshman seminar on basic statistical concepts (mean, variation, association) and exploratory data analysis, Fall 2019

"Introduction to statistical learning," upper-division undergraduate and masters level course on introductory machine learning methods (regression, clustering, splines), Winter 2019

"Data mining and analysis," upper-division undergraduate and masters level course applied machine learning methods (regression, clustering, splines, and semiparametric methods), Fall 2016 and Summer 2017

Graduate level courses

"Applied multivariate analysis," upper-division undergraduate and masters level course in applied multivariate statistical methods (PCA, clustering, mixture models, EM algorithms), Winter 2020

"Advanced statistical theory," topic class in advanced statistical theory (concentration, high-dimensional PCA, nonparametric methods, compressed sensing, graphical models and message passing algorithm), Spring 2019

"Modern applied statistics: learning," advanced course in applied machine learning methods (regression, clustering, splines and reproducing kernel Hilbert space), Winter 2019

"Theory of statistics," graduate level course in advanced statistical theory on multiple hypothesis testing (FWER and FDR, knockoff, selective inference, estimating a multivariate Normal mean), Spring 2018

AWARD

Departmental Teaching Assistant Award, Statistics Department, Stanford University, June 2020 (awarded to 4 PhD students each year)

SERVICE

Justice, Equity, Diversity and Inclusion (JEDI) committee Postdoc representative
Department of Biomedical Data Science, Stanford University Fall 2022-Present

- Identify students' and faculties perspectives on specific issues and suggestions.
- Design and coordinate activities to create a more diverse and inclusive environment in the department.

Stanford Future Advancers of Science and Technology (FAST) Mentor & Outcomes officer
Stanford University 2020-Present

- FAST is a program where Stanford graduate students mentor local high schoolers on science projects and share enthusiasm for science and research. High school students present their work in local science fairs, state science fairs, and an annual Symposium at Stanford University.
- Meet with students twice a month to brainstorm project ideas, carry out experiments and analyze data.
- Design and analyze program surveys and interviews to assess the effect of the FAST on students' confidence and ability to conduct scientific inquiries, and their attitude towards STEM fields, as well as mentors' confidence in mentoring high schoolers. Recommended mentor training topics based on survey results.

Inclusive Mentorship in Data Science Workshop Mentor
Stanford University Winter 2022

- Mentored an underrepresented minority student from non-R1 institution to plan academic and career trajectory, prepare resume, and discuss data science topics.

Stanford Women in Math Mentoring (SWIMM) Mentor
Stanford University 2017-2020

- SWIMM is a mentorship program to encourage undergraduate women to pursue advanced study in mathematics by pairing them with graduate student mentors, sharing resources about events, courses, and fellowship applications, and introducing them to a network of other undergraduate students
- Monthly meetup and check-in with undergraduate mentee to discuss course selection, campus life and career development

Ph.D. student social coordinator 2017
Department of Statistics, Stanford University

- Organized department social events, e.g., tea, happy hours and Chinese New Year potluck
- Applied for Stanford SPICE grant (Student Projects for Intellectual Community Enhancement) ($5000) to fund department retreats where Ph.D. students present their research in a casual environment, and socialize with fellow students and faculty members (more than 3/4 Ph.D. students and three faculty members attend each year)