# Zhehao (Kenny) Zhang

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Research Interest: Causal Inference, Hypothesis testing, Sensitivity Analysis, Graph Theory

## Education

- **Univeristy of Washington, Seattle** — Seattle, WA
  *PhD Student in Statistics (Advisors: Thomas Richardson and Carlos Cinelli)* — *Sept. 2020 – Current*
- **University of California, Santa Barbara** — Santa Barbara, CA
  *B.S. in Mathematics; B.S. in Statistics; GPA: 3.94 (Highest Honor)* — *Sept. 2016 – June. 2020*

## Publication

C. Segal, Z. Zhang, B. T. Karras, D. Revere, G. Zane, J. G. Baseman. "Early Epidemiological Evidence of Public Health Value of WA Notify, a Smartphone-based Exposure Notification Tool: Modeling COVID-19 Cases Averted in Washington State". Preprint Available Online.
Z. Zhang, N. LaPierre, B. Hill, C. Cinelli. "PySensemakr: Sensitivity Analysis Tools for Regression Models in Python ". Preprint Available Online.

## Industrial Experience

- **Google Cloud Platform** — Sunnyvale, CA
  *Software Engineer (PhD) Intern. Deploy G Suite search features.* — *Jun.2022 - Sept.2022*
- **Comcast** — Washington, DC
  *Research Intern. Run offline experiments.* — *Jun.2021 - Sept .2021*

## Research Experience

- **Individual Treatment Effect Bounds in Causal Inference** — Washington, WA
  *Department of Statistics* — *Sept.2021 - Present*
  - **Research Topics**: Supervised by Professor Thomas Richardson. Characterized prediction intervals for the individual treatment effect (ITE) and established sharp bounds on the distribution functions of ITE. **Preprint will be available on ArXiv soon.**
- **Causal Inference and Sensitivity Analysis** — Washington, WA
  *Research Assistant in Department of Statistics* — *Sept.2021 - Present*
  - **Research Topics**: Supervised by Professor Carlos Cinelli. Developed new methods to perform hypothesis testing on causal effects under unmeasured confounders.
  - **Others**: Developed sensitivity analysis tool PySensemakr package in Python . Github.
- **WA Notify Data Analysis and Evaluation Team; University of Washington** — Washington, WA
  *Research Assistant with Department of Public Health* — *Feb.2021 - Jun.2021*
  - **Modeling and Analysis**: Worked with Washington State Department of Health to evaluate the effectiveness of Bluetooth notification technology to eliminate the transmission of COVID-19.
- **Toronto Western Hospital; University of Toronto** — Toronto, ON
  *Summer IMS Researcher (with Dr. Mojgan Hodaie's group)* — *Apr.2020 - Sept 2020*
  - **Optimization**: Develop optimization algorithm based on sphere packing and apply to generatedmulti-modality MRI image.
- **Statistics Department, UCSB** — Santa Barbara, CA
  *Researcher, Senior Thesis (with Prof. Alex Shkolnik)* — *Jan.2019 - Apr.2020*
  - **Optimal James-Stein Shrinkage for Regression**: Develop a new James-Stein type estimator for cross-sectional ordinary least square regression with asymptotic optimization guarantee on dispersion bias. Provide theoretical guarantees and numerical experiments. Thesis.
- **Fields Institute for Mathematical Science** — Toronto, ON
  *Summer REU Researcher (with Prof. Andreas Hilfinger)* — *June.2019 - Sept.2019*

- **Inverse Problem for Stochastic Models**: Inferred rate functions for complex stochastic models in biological processes. Simulate large-scale continuous time Markov Chain and developed algorithms for solving linear network topology models based on Hill functions. Preprint.
- **Others**: Presented at Pacific Math Alliance Conference and Undergraduate Mathematics Symposium.

- **Vitality Group** Santa Barbara, CA; Chicago, IL
  *Data Analyst (with Prof. Ian Duncan and Dr. Xiyue Liao)* *Sept.2018 - Apr.2019*
  - **Multi-Year Longitudinal Diabetes Analysis**: Used Vitality Group dataset to find factors of changing from pre-diabetes to healthy. Used R language to implement elastic net, T-SNE, General Additive Model. Report.
  - **Others**: Graduate level classes PSTAT 296AB. Presented at URCA and InsurTech Summit.

## Projects

- **Option Visualization App**: Wrote a Dash App for option visualization. Link.
- **Hull Tactical ERP prediction contest**: Investigated stock return prediction using Long Short Term Memory (LSTM) models. Won most creative category with $1000 in contest. Link.
- **Time Series Analysis (PSTAT 274)**: Built a Time series model to predict on 5-year break-even inflation rate. Link.
- **Variational Inference (STAT 538)**: A detailed study on a Variational Inference paper used for posterior sampling with implementation. Link.

## Teaching and Service

Service: Managing the UAI Mailing List ..... Sep 2021 — Sept 2022
Teaching Assistant: Statistics, UW
STAT 311 Elements of Statistical Methods. ..... Sep 2020 — Mar 2021
STAT 502 Design and Analysis of Experiments. ..... Jan 2022 — Mar 2022
STAT 504 Applied Regression. ..... Jan 2022/2023 — Mar 2022/2023
STAT 566 Causal Modeling. ..... Mar 2023 — Jun 2023
STAT 396 Finite Markov Chains and Monte-Carlo Methods. ..... Mar 2022 — Jun 2022
Directed Reading Program: Statistics, UW
Teach and guide project on Classification Methods. ..... Jan 2021 — Mar 2021
Teach and guide project on Causal Inference. ..... Sep 2021 — Dec 2021

## Honor and Awards

REU fellowship at Fields Institute in University of Toronto ..... Jun 2019
Most creative category in Hull Tactical ERP Prediction Contest ..... May 2019
Putnam Mathematical Competition, top 5 in UCSB ..... Dec 2017
College of Creative Studies Honor ..... Jan 2017 — Mar 2020
Dean's Honor in College of Letters and Science ..... Sept 2016 — Mar 2020
American Math Competition top 5% worldwide ..... Mar 2016

## Coursework

Probability Theory (A), Stochastic Calculus (A), Time Series (A), Matrix Analysis (A), Regression Methods (A), Advanced Theory for Statistical Inference (A-), Causal Inference (A), Real Analysis (A), Linear Algebra (A+), Stochastic Process (A+), Probability Theory (A+), Bayesian Analysis (A).

## Research Interest

- **Research**: Causal Inference, Regression Analysis, Probability Distribution Bounds