

# ZEYU (JERRY) WEI

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## RESEARCH INTERESTS

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Topological Data Analysis, Manifold Learning, Nonparametric Statistics, Network Analysis

## EDUCATION

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**University of Washington, Seattle** 09/2019 – Present  
**Ph.D., Statistics**

**Advisor:** Yen-Chi Chen, Tyler H. McCormick

**Preliminary Exam:** Sparse Subspace Clustering 06/2020

**Statistical Consulting:** Project applying Mixed Effects Models 12/2020

**Core Coursework:** Machine Learning for Big Data, Statistical Machine Learning, Data Visualization, Network Analysis, Advanced Theory of Statistical Inference, Advanced Probability, Advanced Regression Methods

**University of Wisconsin – Madison** 09/2015-05/2019  
**B.S.**

**Major in Statistics (Honor)**

**Core Coursework:** Applied Regression Analysis, Data Analysis with R, Experiment Design, Categorical Data Analysis, Time Series, Probability & Mathematical Statistics

**Major in Math (Honor)**

**Core Coursework:** Real Analysis, Theory of Probability, Stochastic Processes, Abstract Algebra

**Major in Sociology (Concentration in Analysis and Research)**

**Core Coursework:** Applied Demography, Social Psychology, Sociology of Organizations, Political Sociology, Social-Economic Institutions, Sociological Research Methods, Sociology Practicum

**Certificate in Computer Science**

**Core Coursework:** Data Structure, Intro to AI, Linear Programming Method

## RESEARCH EXPERIENCE

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### **Epidemic Model Failures under Missingness**

Advisors: Tyler McCormick (UW Stats), Arun Chandrasekhar (Stanford Econ), Paul Goldsmith-Pinkham (Yale Management) 09/2021-Present

- Analyzing the performance of Epidemic models under inaccurate graph with missingness
- Investigating how geometric properties of networks affect the impact of missingness

### **Skeleton Regression: A Graph-Based Approach to Estimation on Manifold**

Advisor: Yen-Chi Chen (UW Stats) 08/2021-Present

- Proposing a novel regression framework to deal with covariates lying around some manifold structures with noises
- Published R package at <https://github.com/JerryBubble/skeletonMethods>
- Manuscript in progress

### **Skeleton Clustering: Dimension-Free Density-Aided Clustering**

Advisor: Yen-Chi Chen (UW Stats)

12/2019-Present

- Working on a clustering framework that can deal with large-scale high-dimensional data with fast computation
- Proposed new density-based similarity measures that avoids curse of dimensionality
- Manuscript at <https://arxiv.org/abs/2104.10770> (under journal review)
- R package at <https://github.com/JerryBubble/skeletonClus>
- Visualizations at <https://cse512-22sp.pages.cs.washington.edu/SkeletonVis/>

### **The Effects of Noise Exposure and Aging on the Acoustic Reflex in Normal-Hearing People**

PI: Ward R Drennan (UW Otolaryngology)

01/2020- 08/2020

- Applying Mixed Effects Models to identify potential indicators of subclinical hearing problems from experimental Audiology data
- Accepted for poster presentation at the 181<sup>st</sup> Meeting of the Acoustical Society of America
- Poster presentation at the 182<sup>nd</sup> Meeting of the Acoustical Society of America in Denver, Colorado on May 26, 2022.

### **Undergrad Honor Thesis in Statistics**

07/2018-05/2019

Advisor: Zhengjun Zhang (UW-Madison Stats)

- Modeling maxima series with Autoregressive Conditional Fréchet (AcF) Model, which incorporates dynamic components into a generalized extreme value model
- Conduct data experiments on S&P 500 constituents with AR(1) and GARCH(1,1) filters

### **Fields Undergraduate Summer Research Program**

07/2018-08/2018

Advisor: Mark Chignell (UToronto Engineering)

- Used cluster-boosted regression to improve predictions and deidentify confidential data
- Carried out Monte Carlo Simulation experiments to determine distributional properties that influence the boosting effect in cluster-boosted regression
- Drafted scientific report *Effectiveness of Cluster-Boosted Regression*

### **UW-Madison Summer School in Harmonic Analysis**

05/2018-07/2018

Advisor: Tess Anderson (UW-Madison Math)

- Paper "*On the translates of general dyadic systems on  $R$* " published on *Mathematische Annalen*
- Generalized the notion of distinct dyadic system Provided classification criteria for distinct grids

### **Wisconsin Policy Analysis Lab**

01/2018-05/2018

Advisor: Jason Fletcher (UW-Madison Sociology)

- Wrote report *Change in Distance to Nearest Abortion Facility in Wisconsin, 2010 to 2017*

### **National Council on Crime & Delinquency**

2017.05-2017.08

Data Analyst Intern

- Managed Oracle database and generated data analytics reports to help coordinate agencies working for child welfare and juvenile justice cases
- Worked on modularizing reports for system conversion

### **Data Analyst at BerbeeWalsh Department of Emergency Medicine**

2017.02-2017.10

PI: Shah, Manish N.

- Performed database management for the study on *Paramedic Coached ED Care Transitions to Help Older Adults Maintain Their Health*

## Applied Demography Research

2017.01-2017.05

Advisor: Katherine Curtis (UW-Madison Sociology)

- Conducted final project with the Applied Population Laboratory and wrote a report on *Health Insurance Coverage in Wisconsin*, analyzed at county level

## PUBLICATIONS

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### *Publications*

Anderson, T.C., Hu, B., Jiang, L., Olson, C., Wei, Z. *On the translates of general dyadic systems on  $R$* . Math. Ann. 377, 911–933 (2020). <https://doi.org/10.1007/s00208-019-01951-z>

### *Technical Reports*

Fletcher, J., Madden, J., Romell, E., & Wei, Z. (2018). *Change in Distance to Nearest Abortion Facility in Wisconsin, 2010 to 2017*. <http://www.lafollette.wisc.edu/research-public-service/publications>

### *Preprint*

- Wei, Z., Chen, Y. *Skeleton Clustering: Dimension-Free Density-based Clustering*. <https://arxiv.org/abs/2104.10770>

## HONORS AND AWARDS

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- **Student & Early Career Travel Award** by American Statistical Association 2022
- **Graduate Student Conference Presentation Award** by UW Graduate School 2022
- **GPSS Travel Grant** by UW Graduate & Professional Student Senate 2022
- **R. Creighton Buck Scholarship** 2019
- Awarded to graduating math major who has completed the best capstone experience as determined by the awards committee in Department of Mathematics, University of Wisconsin-Madison
- **Phi Beta Kappa Honors Society Member** 2018
- inducted as Junior, 5%
- **3rd place in Midwest Undergraduate Data Analysis Competition** 2017

## PRESENTATIONS

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- *Skeleton Regression: A Graph-Based Approach to Estimation on Manifold*, 2022 Symposium on Data Science & Statistics, Jun 2022

-*Skeleton Clustering: Dimension-Free Density-Based Clustering*, JSM 2021, Aug 2021

-*Skeleton Clustering*, IFDS 2021 Summer School, July 2021

-*Skeleton Clustering*, UW Geometric Data Analysis Group, Feb 2021

-*Graph Laplacian and Linear Smoother*, UW Geometric Data Analysis Group, Feb 2020

-*Autoregressive Conditional Fréchet (AcF) Model*, Undergraduate Symposium at the University of Wisconsin-Madison, May 2019

-*On the translates of general dyadic systems on  $R$* , Undergraduate Mathematics Symposium, University of Illinois at Chicago, November 2018

## TEACHING EXPERIENCE

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**Teaching Assistant**, University of Washington, Department of Statistics 09/2019-Present  
-CSE 416: Introduction to Machine Learning (Spring 2022)  
-STAT 390: Statistical Methods in Engineering and Science (with Caren Marzban, Fall 2020)  
-STAT 221: Statistical Concepts and Methods for the Social Science (with William Brown, Summer 2020)  
-STAT 220: Statistical Reasoning (with William Brown, Winter 2020)  
-STAT 311: Elements of Statistical Methods (with Ranjini Grove, Fall 2019; with Tamre Cardoso, Spring 2020)

**Student Tutor&Grader**, UW-Madison, Department of Mathematics 07/2017-05/2019  
-Tutor and grader for undergraduate Math classes on Math Analysis, Probability Theory, and Linear Algebra

## SERVICES & VOLUNTEERS

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**Organizer of the Geometric Data Analysis Reading Group**, UW Statistics 10/2021-Present

- Organize bi-weekly events with Professor Marina Meila and Yen-Chi Chen discussing recent works on Geometric Data Analysis
- Maintaining the reading group website at <https://uwgeometry.github.io/>

**Lead Tutor**, UW Statistics 09/2021-Present

- Organizing the free drop-in tutoring service offered by UW statistics
- Interview tutors and manage tutoring schedules
- Connect with Stat and Stat-related course instructors for needs

**Mentor for Directed Reading Program Project**, UW SPA 12/2020-03/2021

- Mentor an undergraduate student on elementary Non-Parametric Statistics
- Student got into the REU Program at the University of North Carolina, May-July 2021

**Student Representative at Undergrad Statistics Committee**, UW-Madison 09/2017-05/2019  
**President of the Undergraduate Statistics Club**, UW-Madison 05/2018-05/2019  
**Executive of the Undergraduate Statistics Club**, UW-Madison 01/2017-05/2018

- Organize events to facilitate career developments for statistics students
- Coordinate with the Statistics Department about student needs
- Initiated the first UW-Madison Data Science Challenge 2018

**Peer Advisor for Multicultural Learning Community**, UW-Madison 01/2016-12/2016

- Help incoming students from culturally diverse backgrounds to adopt to college life and guide them to various learning resources.
- Organize service-learning events about important cultural, societal, and environmental issues.

## COMPUTER SKILLS AND LANGUAGES

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**Proficient** in R, Python, MATLAB, Excel  
**Familiar** with Java, SQL, C++, Mathematica, Altair, Vega-Lite, D3.js

**Languages:** English, Chinese (native)