MINGXUAN (ADRIAN) CAO (THEY/THEM/THEIRS)

(last update: January 3, 2024)
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EDUCATION

Washington University in St. Louis *May 2024 (Expected)*
AB+AM in Statistics (Honors)
Second Major in Economics and Strategy
Minor in History
Overall GPA: 3.95; GRE: 336/340 (February 2022)

RESEARCH EXPERIENCE

Missing DPA: Estimating factors in factor analysis for datasets with missing entries [1] May 2023 - Present
Advisor: Chetkar Jha *Washington University*

- Overcame technical challenges in finding the appropriate number of factors to high-dimensional datasets with missing entries by innovatively utilizing random matrix theories including shifted Marcenko-Pastur distribution, adapting eigenvalue thresholding techniques to accommodate missing data effectively.
- Integrated principles from the Expectation-Maximization algorithm, developing a nuanced and robust adaptation of the DPA method, enhancing its reliability and applicability in handling real-world datasets with missing values for accurate factor selection and data analysis with comparisons to traditional spectral methods and likelihood methods.

A Machine Learning Approach to Predicting Opioid Use in Women with Breast Cancer [1] Apr. 2023 - Present
Advisor: Prajakta Masurkar *AMGEN INC.*

- Applied sophisticated machine learning methodologies to identify predictors of opioid use in women with breast cancer, aiming to pinpoint individuals at heightened risk of opioid addiction or other consequential public health challenges. This strategic approach facilitates targeted interventions, ensuring that patients receive the requisite treatment promptly.
- Conducted intricate investigations into stochastic gradient descent methods for causal inference, focusing on decision-making processes influenced by multiple conditions and comorbidities. Specialized in scenarios involving multiple anti-drug resistances or various disease sources, enhancing the accuracy and relevance of predictive analytics in determining response variables.

High-dimensional Time Series Change Point Detection in Neuronal Activity Analysis Apr. 2023 - Aug. 2023
Advisor: Likai Chen *Washington University*

- Spearheaded neuron activity detection using change point detection, specifically employing moving sum and moving quantile techniques, to analyze behavioral state transitions, with a focus on sleep behavior in cross-sectional data.
- Applied these methodologies to lab designed data, handling a substantial dataset comprising 65 neurons with numerous spikes. Innovatively introduced subsectioning strategies to select specific neurons, enhancing the precision and relevance of the analysis in the context of behavioral changes.

Bootstrap Estimation of Pre-averaged Volatility under Microstructure Noise [1] May 2022 - Apr. 2023
Advisor: José Figueroa-López *Washington University*

- Conducted meticulous independent honor thesis focused on bootstrap methods for dependent variables in diffusion processes. Aimed to mitigate the finite distortions induced by the pre-averaging debiased method on implied volatility, optimizing the coverage rate through innovative methodological adjustments.

[1] **WORKING PAPER in progress.**

· Pioneered the development of a novel online bootstrap method that synergistically combines wild bootstrap and block bootstrap techniques. This approach was meticulously crafted to resample blocking models for stock data, establishing the asymptotic unbiasedness of the newly introduced volatility estimator, thereby enhancing the precision and reliability of financial data analysis.

Women's returns of Post-Business Degrees in the Labor Market Jan. 2022 - May 2022
Advisor: Brent Hickman *Washington University*

· Conducted a profound analysis to assess the impact of business degrees on women's positioning in the labor market, utilizing hierarchical linear models on extensive datasets. This research was instrumental in uncovering nuanced insights into the disparities women face in professional realms despite educational advancements in business studies.
· Employed sophisticated statistical models on time series data to drive causal inference, aiming to unveil patterns indicative of discrimination in educational pursuits and hiring practices. This analytical approach was pivotal in identifying systemic barriers and biases that perpetuate gender disparities in the labor market.

PROFESSIONAL EXPERIENCE

MorningStar, Inc. June 2023 – Aug. 2023
Investor Relations Intern *Chicago, IL*

· Performed comprehensive data analysis, including competitor analysis, examining growth, profitability, and other key metrics, utilizing data visualization to communicate information in quarterly earnings release and presentation and board meeting.
· Applied quantitative research skills, including AI techniques, to extract insights from financial data, aiding in identifying market trends and providing knowledge of investment strategies, financial products, and industry dynamics for investors' questions.

Shanghai Seeking Sense Investment Management Co., Ltd July 2022 - Aug. 2022
Quantitative Investment Analyst *Shanghai, China*

· Developed industry rotation models using PSY unit root test and Bayesian Online Changepoint Detection to detect bubble signals in fundamentals, achieving a 140+% annualized return and 13% max retracement.
· Researched convertible-bond-based strategy and formed stable income model that generates 80+% annualized returns by seizing low premium rate and low-price bonds using R and Python; studied value appropriation of industrial chain of chips in China.

TEACHING & MENTORING

Teaching Assistant at Washington University

- Math 461/5155: Time Series Analysis (AI & Grader) Fall 2023
- Math 459: Bayesian Statistics (UTA & Grader) Spring 2023
- Math 495: Stochastic Processes (UTA & Grader) Spring 2023
- Math 456: Topics in Financial Mathematics (UTA & Grader) Fall 2022
- Math 4211: Statistics for Data Science II (UTA & Grader) Spring 2022

HONORS & AWARDS

- Magna Cum Laude, Washington University 2023
- Highest Distinction Graduate in Statistics 2023
- 2023 MCM/ICM Honorable Mention 2023
- 2023 Freiwald Scholars Fellowship in the Department of Math and Statistics of Washington University 2023

- Dean's List in the College of Arts and Science in Washington University: FL2020, FL2021, SP2022, FL2022, SP2023
- The first prize of 23th National Olympiad in Informatics in Provinces (Zhejiang) 2017

CONFERENCE & WORKSHOP

- Committee of Princeton Fintech & Quant Conference in Chicago Oct. 2023
- Attened StanCon 2023 June 2023
- Washington University Undergraduate Research Symposium Apr. 2023
  Undergraduate Honors Thesis Presentation: Bootstrap estimation for pre-averaged realized volatility under market microstructure noise
- Attended Princeton Fintech & Quant Conference 2023 Apr. 2023

TECHNICAL STRENGTHS

Computer Languages	Pascal, C++, Java, R, Stata, Python, MATLAB, SQL, LaTex, Mathematica, SAS
Languages	English (bilingual), Mandarin Chinese (native), French (elementary)