

# Hao Zeng

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## EDUCATION

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| <b>Gregory and Paula Chow Institute for Studies in Economics, Xiamen University</b>                  | Sept. 2020 – Jun. 2024                 |
| <i>Ph.D. in Statistics, Supervised by Wei Zhong, Xingbai Xu, and Tuo Liu</i>                         |  |
| <b>Wang Yanan Institute for Studies in Economics, Xiamen University</b>                              | Sept. 2018 – Jun. 2020                 |
| <i>M.S. in Quantitative Economics</i>  | <i>Transfer to Ph.D. in Statistics</i> |
| <b>School of Mathematics, Shandong University</b>  | Sept. 2014 – Jun. 2018                 |
| <i>B.S. in Mathematics (Peng's Class: Base of Financial Mathematics &amp; Financial Engineering)</i> |  |

## RESEARCH AREA

**Statistical Machine Learning:** Model Free Predictive Inference, Conformal Prediction, Transfer Learning

**Interdisciplinary Research:** Large Language Models, Spatial Statistics, Econometrics, and Biostatistics

## EXPERIENCE

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|---|-----------------------|
| <b>Southern University of Science and Technology &amp; National University of Singapore</b>         | Jul. 2024 – Present   |
| <i>Postdoctoral Researcher in Statistics, Supervised by Bingyi Jing, Hongxin Wei, and Wang Zhou</i> |                       |
| <b>Department of Statistics and Data Science, National University of Singapore</b>                  | May 2023 – Oct. 2023  |
| <i>Visiting Researcher, Cooperated with Tao Yu</i>  |                       |
| <b>School of Economics, Xiamen University</b>   | Fall 2022             |
| <i>Teaching Assistant in Probability Introduction (Undergraduate)</i>                               |                       |
| <b>School of Economics, Xiamen University</b>   | Spring 2022           |
| <i>Teaching Assistant in Real Analysis (Undergraduate)</i>  |                       |
| <b>School of Economics, Xiamen University</b>   | Fall 2021             |
| <i>Teaching Assistant in Advanced Probability Theory (Postgraduate)</i>                             |                       |
| <b>School of Economics, Xiamen University</b>   | Spring 2021           |
| <i>Teaching Assistant in Real Analysis (Undergraduate)</i>  |                       |
| <b>School of Economics, Xiamen University</b>   | Fall 2019             |
| <i>Teaching Assistant in Advanced Econometrics I (Postgraduate)</i>                                 |                       |
| <b>Accenture (China)</b>  | Apr. 2018 – Aug. 2018 |
| <i>Power Enterprise Management Consulting Project</i>   |                       |

## PUBLICATIONS

(\* means corresponding author, † means equal contribution, ◇ means supervised students.)

### Journal Articles

6. **Hao Zeng**, Wei Zhong, & Xingbai Xu (2025). “Transfer Learning for Spatial Autoregressive Models with Application to U.S. Presidential Election Prediction.” (Accepted for **Journal of Business & Economic Statistics**, econometrics and statistics top journal, ABS 4\*)
5. Kangdao Liu<sup>◇</sup>, Tianhao Sun, **Hao Zeng**, Yongshan Zhang, Chi-Man Pun, & Chi-Man Vong (2025). “Spatial-Aware Conformal Prediction for Trustworthy Hyperspectral Image Classification.” **IEEE Transactions on Circuits and Systems for Video Technology** 35 (9): 8754–8766. (CAS Q1 journal, Top)
4. **Hao Zeng**, Chuang Wan, Wei Zhong, & Tuo Liu (2024). “Robust Integrative Analysis via Quantile Regression with Homogeneity and Sparsity.” **Journal of Statistical Planning and Inference** 234 (January): 106196.
3. Chuang Wan<sup>†</sup>, **Hao Zeng**<sup>†\*</sup>, Wenyang Zhang<sup>†</sup>, Wei Zhong<sup>†</sup>, & Changliang Zou<sup>†</sup> (2024). “Data-driven Estimation for Multithreshold Accelerated Failure Time Model.” **Scandinavian Journal of Statistics** 52 (1): 447–468.
2. Wenqian Chen, **Hao Zeng**, Xiaoya Wang, Qiuping Xu, Panpan Liu, Liwei Zhang, Yingyue Hou, Qing Luo, Xueye Liu, Zhe Jiang, Zhiyuan Zhou, Jiang Chen, & Jing Guo (2022). “A Structural Equation Modeling Approach to Determine the Correlation between the Vertical and Sagittal Skeletal Patterns and Posterior Basal Bones Mismatching in Patients with Skeletal Class III Malocclusion.” **American Journal of Orthodontics and Dentofacial Orthopedics** 162 (6): e277–294. (Cover paper)
1. Wenqian Chen, **Hao Zeng**, Luna Sun, Qiuping Xu, Zhenxue Chen, Yunhan Sun, Qi Jia, Chengyun Liu, & Jing Guo (2021). “Match of the Bimaxillary Basal Bone Arches and Its Variations among Individuals.” **Scanning** 2021 (1): 9625893.

### Conference Papers

3. **Hao Zeng**<sup>†</sup>, Kangdao Liu<sup>†</sup>, Bingyi Jing, & Hongxin Wei (2025). “Parametric Scaling Law of Tuning Bias in Conformal Prediction.” **42nd International Conference on Machine Learning (ICML 2025)**. (AI/ML Top)

2. Huajun Xi<sup>◦</sup>, Kangdao Liu, **Hao Zeng**, Wenguang Sun, & Hongxin Wei (2025). “Exploring the Noise Robustness of Online Conformal Prediction.” **39th Annual Conference on Neural Information Processing Systems (NeurIPS 2025)**. (AI/ML Top)
1. Kangdao Liu<sup>◦</sup>, **Hao Zeng**, Jianguo Huang, Huiping Zhuang, Chi-Man Vong, & Hongxin Wei (2025). “C-Adapter: Adapting Deep Classifiers for Efficient Conformal Prediction Sets.” **28th European Conference on Artificial Intelligence**.

## Working Papers

19. Jingyi Zhang<sup>◦</sup>, Yang Yue, Wei Zhong, & **Hao Zeng\*** (2025). “Robust Estimation of Grouped Network Vector Autoregression: An Empirical Analysis Based on China Air Quality Data.” (Submitted to **Statistical Research**)
18. **Hao Zeng**, & Chao Liu (2025). “TL-FCSAR: A Transfer Learning Model for Heterogeneous Spatial Effects in U.S. Presidential Elections.” (Submitted to **Spatial Statistics**)
17. Wenqian Chen<sup>†</sup>, **Hao Zeng<sup>†</sup>**, Jiawen Lei, Yuanning Hou, Chunxun Du, Yiyao Zhang, Yi Lin, Xianan Chen, & Tianrong He (2025). “Sex-specific Associations between Craniofacial Skeletal Patterns and Condylar Morphology and Position in Temporomandibular Joint Osteoarthritis: A Three-dimensional Latent Variable Analysis.” (Submitted to **Journal of Dentistry**)
16. Huipeng Huang<sup>◦</sup>, Wenbo Liao, Huajun Xi, **Hao Zeng**, Mengchen Zhao, & Hongxin Wei (2025). “Selective Labeling with False Discovery Rate Control.” (Submitted to **The 14th International Conference on Learning Representations (ICLR 2026)**)
15. Zhenlong Liu<sup>◦</sup>, **Hao Zeng**, Weiran Huang, & Hongxin Wei (2025). “High-Power Training Data Identification with Provable Statistical Guarantees.” (Submitted to **The 14th International Conference on Learning Representations (ICLR 2026)**)
14. **Hao Zeng<sup>†</sup>**, Jianguo Huang<sup>†◦</sup>, Bingyi Jing, Hongxin Wei, & Bo An (2025). “PAC Reasoning: Controlling the Performance Loss for Efficient Reasoning.” (Submitted to **The 14th International Conference on Learning Representations (ICLR 2026)**)
13. Hongfu Gao, Feipeng Zhang, **Hao Zeng**, Deyu Meng, Bingyi Jing, & Hongxin Wei (2025). “Exploring Imbalanced Annotations for Effective In-Context Learning.” (Submitted to **The 14th International Conference on Learning Representations (ICLR 2026)**)
12. Xuanning Zhou<sup>◦</sup>, Zihao Shi<sup>◦</sup>, **Hao Zeng**, Xiaobo Xia, Bingyi Jing, & Hongxin Wei (2025). “Semi-Supervised Conformal Prediction with Unlabeled Nonconformity Score.” (Submitted to **The IEEE/CVF Conference on Computer Vision and Pattern Recognition 2026 (CVPR 2026)**)
11. **Hao Zeng**, Bingyi Jing, & Hongxin Wei (2025). “Conditional Tuning in Conformal Prediction.”
10. **Hao Zeng**, Bingyi Jing, & Hongxin Wei (2025). “The Double Descent of Conformal Prediction.”
9. **Hao Zeng**, Kangdao Liu, Bingyi Jing, & Hongxin Wei (2025). “On Tuning Bias in Conformal Prediction.”
8. **Hao Zeng**, & Jianguo Huang<sup>◦</sup> (2025). “PAC Accelerate: A Statistically Guaranteed Acceleration Method for Large Generative Models.”
7. **Hao Zeng**, & Jianguo Huang<sup>◦</sup> (2025). “Group-Conditional PAC Reasoning: Groupwise Efficient Reasoning with Statistical Guarantees.”
6. **Hao Zeng** (2025). “A Note on the Impossibility of Conditional PAC-Efficient Reasoning.”
5. **Hao Zeng**, Jiajun Sun<sup>◦</sup>, Bingyi Jing, & Wei Zhong (2025). “Test-time Valid Selection of Conformal Sets via Gaussian Stability.”
4. **Hao Zeng**, Junxian Liu<sup>◦</sup>, Bingyi Jing, & Hongxin Wei (2025). “Efficient Backward Conformal Prediction.”
3. **Hao Zeng**, Wei Zhong, Chuang Wan (2025). “Selective Inference for the Identified Groups in Network Vector Autoregressive Model.”
2. **Hao Zeng**, Huipeng Huang<sup>◦</sup>, Jianguo Huang<sup>◦</sup>, Bingyi Jing, & Hongxin Wei (2025). “HyPAC: Hybrid Labeling for LLMs via Multi-level PAC Reasoning.”
1. Xiaoqi Qiu<sup>†◦</sup>, **Hao Zeng<sup>†</sup>**, Bingyi Jing, & Hongxin Wei (2025). “LLM Provenance Testing via Constrained Model Confidence Sets.”

## Software

1. Chuang Wan, **Hao Zeng**, Wei Zhong, & Changliang Zou (2023). “MTAFT: Data-Driven Estimation for Multi-Threshold Accelerate Failure Time Model.” <https://cran.r-project.org/web/packages/MTAFT/index.html>

## CONFERENCE PRESENTATIONS

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|   |                                     |
|---|-------------------------------------|
| <i>Talk in The 2021 Forum for Doctoral Students in Quantitative Economics</i>                             | <i>Dec. 2021, Xiamen</i>            |
| <i>Talk in Xiamen University 2021 Symposium on Modern Statistics</i>                                      | <i>Dec. 2021, Xiamen</i>            |
| <i>Invited Talk in 2023 PhD Forum on Econometric Modeling and Economic Policy Research</i>                | <i>Nov. 2023, Beijing</i>           |
| <i>Poster in Conference of the Youth Association of the Chinese Association for Industrial Statistics</i> | <i>Mar. 2024, Xuzhou</i>            |
| <i>Invited Talk in The 1st Outstanding PhD Forum in Economics and Management Statistics</i>               | <i>Jun. 2024, Xiamen</i>            |
| <i>Invited Talk in The 2nd Joint Conference on Statistics and Data Science</i>                            | <i>Jul. 2024, Kunming</i>           |
| <i>Talk in The 13th Conference on Probability and Statistics</i>  | <i>Nov. 2024, Xiamen</i>            |
| <i>Poster in The 3rd Joint Conference on Statistics and Data Science</i>                                  | <i>Jul. 2025, Hangzhou</i>          |
| <i>Poster in Forty-Second International Conference on Machine Learning</i>                                | <i>Jul. 2025, Vancouver, Canada</i> |
| <i>Talk in Xiamen University 2025 Symposium on Modern Statistics</i>                                      | <i>Dec. 2025, Xiamen</i>            |

## ACADEMIC SERVICES

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**Journal Reviewer** International Statistical Review, Journal of Multivariate Analysis, Spatial Economic Analysis, and Quarterly Journal of Economics and Management.

**Conference Reviewer** International Conference on Artificial Intelligence and Statistics (AISTATS), AAAI Conference on Artificial Intelligence(AAAI), International Conference on Machine Learning (ICML), International Conference on Learning Representations (ICLR), IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)

## AWARDS

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| <i>Excellent Teaching Assistant in Fall 2022-2023, Xiamen University</i>                       | <i>2024</i> |
| <i>Meritorious Winner, Interdisciplinary Contest in Modeling, USA</i>                          | <i>2016</i> |
| <i>3rd Prize at the Provincial Level, Mathematics Competition for Chinese College Students</i> | <i>2016</i> |
| <i>2nd Prize at the Provincial Level, China Undergraduate Mathematical Contest in Modeling</i> | <i>2015</i> |
| <i>1st Prize for Outstanding Students (Top 5%), Shandong University</i>                        | <i>2015</i> |
| <i>Merit Student (Top 5%), Shandong University</i>   | <i>2015</i> |