Mingyi Zheng

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Education

Shanghai University of Finance and Economics, School of Statistics and Data science Sep 2022 – Jun 2026

- GPA: 3.63/4.0 , Rank: 7/101.
- **Coursework:** Mathematics Analysis, Linear Algebra, Probability Theory, Mathematical Statistics, Operations Research, Real Analysis, Complex Analysis, Stochastic Processes, Time Series Analysis, Python Programming, Data Structure, Database.

University of California, Berkeley, BGA program Aug 2024 – Dec 2024

- GPA: 4.0/4.0.
- **Coursework:** Introduction to Artificial Intelligence, Modern Statistical Prediction and Machine Learning, Linear Modelling: Theory and Applications, Simulation for Enterprise-Scale Systems.

Working Papers

** denotes equal contribution.*

- **Zheng, M.***, Jiang, H.*, Lu, Y.*, Teng, J.(2025). Smoothing-Based Conformal Prediction for Balancing Efficiency and Interpretability. *Submitted to ICLR 2026*. [preprint]
- **Zheng, M.**, Jin, Y.(2025). Online Selective Conformal Prediction with Asymmetric Rules: A Permutation Test Approach. [preprint]
- **Zheng, M.***, Xin, B.*, Qiu, Y.(2025). Differentiable Meta Learning via Auto-learned Loss Function. *Working in progress*.

Research Experience

Online Selective Conformal Prediction with Selection Conditional Coverage Mar 2025 – Present

Advisor: Prof. Ying Jin, Department of Statistics and Data Science at the Wharton School, University of Pennsylvania.

- Developed a general permutation-based framework for constructing prediction sets in online selective conformal prediction, which accommodates an arbitrary asymmetric selection rule.
- Designed a randomized version of the general algorithm, improving computational efficiency significantly while rigorously preserving finite-sample validity of the resulting prediction sets.
- Proposed specialized algorithms for several classes of common selection rules based on their special structure to further enhance computational efficiency while maintaining validity.
- Rigorously proved that both the general framework and each variant yield prediction sets that satisfy selection-conditional coverage in the finite-sample setting.
- Demonstrated through extensive simulations and real-world experiments (covering 10+ selection rules) that our framework handles a wide range of asymmetric selection rules and also improves practical performance for selection rules that are tractable by existing methods by alleviating their conservativeness.

Smoothing-Based Conformal Prediction for Interpretability Dec 2024 – Sep 2025

Advisor: Prof. Jiaye Teng, School of Statistics and Data Science, Shanghai University of Finance and Economics.

- Proposed a smoothing-based framework by applying post-hoc smoothing techniques (such as Fourier smoothing) on conditional density estimation, aiming to achieve a better balance between accuracy and interpretability.
- Provided rigorous theoretical guarantees by proving the validity of the proposed method, deriving an upper bound on the growth of interval length, and showing that the number of intervals remains non-increasing.
- Conducted several experiments on both synthetic datasets and real-world datasets, demonstrating the validity of our method and the better interpretability of the resulting prediction set in the practical scenarios.

Differentiable Meta Learning via Auto-Learned Loss Functions Dec 2023 – Present

Advisor: Prof. Yixuan Qiu, School of Statistics and Data Science, Shanghai University of Finance and Economics.

- Developed a bilevel optimization framework for automatic loss function design, focusing on ReHLine, a parameterized model composed of ReLU- and ReHU-based structural units with tunable hyperparameters.
- Derived an efficient algorithm for hyperparameter optimization by leveraging block matrix structures and sparsity properties unique to ReHLine, enabling efficient backward propagation for loss function learning.
- Implemented a PyTorch-compatible module supporting automatic differentiation for ReHLine hyperparameters.
- Conducted preliminary experiments on regression tasks, demonstrating better generalization and robustness performance in several complex settings.

Research Interests

- Uncertainty qualification, Distribution-free inference, Machine learning

Honors and Awards

Scholarship for Research Innovation	2025
Scholarship for Academic Excellence	2023
Second Prize of the People's Scholarship Award	2023

Skills

- **Programming:** Python (& Pytorch), C++, R, Matlab, LaTeX
- **Languages:** Mandarin (native), English (TOEFL 101, GRE 326)