Zhiyuan (Leo) ZHAO

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Personal Statement

I'm a second-year Machine Learning Ph.D. student in the Department of Computational Science and Engineering at Georgia Institute of Technology. I am affiliated with AdityaLab, as advised by Dr. B Aditya Prakash. **My research focuses on time-series forecasting by leveraging attention, causality, graph models, and physics regularization methods.** These research results have made real-world influences such as Flu and COVID-19 forecasting challenges organized by CDC.

I am also interested in pre-trained foundation models and applications of LLMs in time series tasks. Previously, my research spanned **physics-informed neural networks** with the advice of Prof. Aarti Singh, and **federated learning** under the advice of Prof. Gauri Joshi at Carnegie Mellon University.

Education

Georgia Institute of Technology — Atlanta, GA

Ph.D. in Machine Learning — *Aug 2027 (Expected)*

- **GPA:** 4.0/4.0
- **Primary Advisor:** B. Aditya Prakash
- **Research Interest:** Machine Learning, Time Series, Computational Epidemiology
- **Core Courses:** Mathematical Foundation of Machine Learning, Probabilistic Graph Model, Natural Language Processing, Computational Data Analysis, Data Science for Epidemiology

Carnegie Mellon University — Pittsburgh, PA

M.S. in Electrical and Computer Engineering — *May 2021*

- **GPA:** 3.94/4.0
- **Primary Advisor:** Gauri Joshi
- **Thesis:** Towards Fairness in Federated Learning
- **Core Courses:** Intro to Machine Learning/Deep Learning, Algorithms for Large-scale Distributed Machine Learning and Optimization, Computer Vision, Image and Video Processing, Convex Optimization, SLAM

The Ohio State University — Columbus, OH

B.S. in Mathematics, Applied Track, Magna Cum Laude — *Aug 2019*

- **GPA:** 3.9/4.0
- **Thesis:** Robust Constant Modulus Algorithm of Equalizer in Telecommunication System

Publications

Pre-Print

Haoxin Liu, Shangqing Xu, **Zhiyuan Zhao**, Lingkai Kong, Harshavardhan Kamarthi, Aditya B Sasanur, Megha Sharma, Jiaming Cui, Qingsong Wen, Chao Zhang, B Aditya Prakash. "Time-MMD: A New Multi-Domain Multimodal Dataset for Time Series Analysis." *arXiv preprint arXiv:2406.08627*. 2024.

Wenjie Du, Jun Wang, Linglong Qian, Yiyuan Yang, Fanxing Liu, Zepu Wang, Zina Ibrahim, Haoxin Liu, **Zhiyuan Zhao**, Yingjie Zhou, Wenjia Wang, Kaize Ding, Yuxuan Liang, B Aditya Prakash, Qingsong Wen. "TSI-Bench: Benchmarking Time Series Imputation." *arXiv preprint arXiv:2406.12747*. 2024.

Zhao, Zhiyuan, Haoxin Liu, Alexander Rodríguez, and B.Aditya Prakash. "Performative Time-Series Forecasting." *arXiv preprint arXiv:2310.06077*. 2023.

Conference

Zhiyuan Zhao*, Haoxin Liu*, Jindong Wang, Harshavardhan Kamarthi, B.Aditya Prakash. "LSTPrompt: Large Language Models as Zero-Shot Time Series Forecasters by Long-Short-Term Prompting." *Findings of the Association for Computational Linguistics: ACL 2024*. ACL, 2024.

Haoxin Liu, Harshavardhan Kamarthi, Lingkai Kong, **Zhiyuan Zhao**, Chao Zhang, B.Adtiya Prakash. "Time-Series Forecasting for Out-of-Distribution Generalization Using Invariant Learning." *International Conference on Machine Learning (ICML)*. 2024.

Zhao, Zhiyuan, Xueying Ding, and B.Aditya Prakash."PINNsFormer: A Transformer-Based Framework For Physics-Informed Neural Networks." *International Conference on Learning Representations (ICLR)*. 2024.

Zhao, Zhiyuan, and Gauri Joshi. "A dynamic reweighting strategy for fair federated learning." *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. IEEE, 2022.

Wen, Senhao, **Zhiyuan Zhao**, and Hanbing Yan. "Detecting malicious websites in depth through analyzing topics and web-pages." *Proceedings of the 2nd International Conference on Cryptography, Security and Privacy*. 2018.

Journal

Sarabeth M. Mathis, et al. "Evaluation of FluSight influenza forecasting in the 2021–22 and 2022–23 seasons with a new target laboratory-confirmed influenza hospitalizations." *Nature communications* 15.1 (2024): 6289.

Yang, Fan, Muqiao Yang, Xiang Li, Yuxuan Wu, **Zhiyuan Zhao**, Bhiksha Raj, and Rita Singh. "A closer look at reinforcement learning-based automatic speech recognition." *Computer Speech & Language* (2024): 101641.

Workshop

Zhao, Zhiyuan, et al. "Physics Informed Machine Learning with Misspecified Priors: An analysis of Turning Operation in Lathe Machines." *AAAI 2022 Workshop on AI for Design and Manufacturing (ADAM)*. 2022.

Experience

Research Scientist Intern, Amazon SCOT Forecasting — New York, NY
Topic: Cross-ASIN Learning for Promotional Event Forecasting. — *(Full-Time) May 2024 – Aug 2024*, *(Part-Time) Sep 2024 – Dec 2024*

Research Associate, Carnegie Mellon University — Pittsburgh, PA
Topic: Misspecificed Physics-Informed Neural Networks. Advisor: Prof. Aarti Singh — *June 2021 – July 2022*

Service

Journal Reviewer: IEEE Intelligent Systems, ACM Transactions on Intelligent Systems and Technology

Conference Reviewer: ICLR 2025/2024, NeurIPS 2024/2023/2022, ICML 2024/2022, AAAI 2025, KDD 2024, KDD 2024/2023 EpiDAMIK Workshop

Social Challenge Contribution:

- CDC FluSight Forecasting Hub: Influenza Hospitalization Forecasting — *Aug 2022 – April 2024*
- CDC COVID-19 Forecasting Hub: COVID-19 Mortality Forecasting — *Aug 2022 – April 2023*

Teaching Assistant:

- Data Science for Epidemiology — *Fall 2023*
- Intro. to Machine Learning for Engineers — *Spring 2021*

Technical Skill

Programming Language: Python, C/C++, MatLab, Verilog, VHDL
Frameworks & Tools: Pytorch, Tensorflow, OpenCV, Tensorflow, LaTeX, SQL, Git