

ChengAo Shen

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RESEARCH INTERESTS

My research primarily advances **Time Series Modeling** through **Multi-modal Learning**, where I design frameworks to transfer Large Vision Models (LVMs) and Vision-Language Models (VLMs) to solve forecasting and anomaly detection challenges. In parallel, I focus on **Causal Discovery** with cutting-edge methods, specifically building **Agent-based systems** to enhance interpretability. These methodologies are applied across diverse domains, including energy, finance, and healthcare.

EDUCATION

Ph.D. in Computer Science at University of Houston Jan 2025 – Present
• Advisors: Jingchao Ni
B.Sc. in Information and Computing Science at Sichuan Agricultural University Sep 2020 – Jun 2024
• Advisors: Zhaoli Shen and Houhui Huang

WORK EXPERIENCE

Teaching Assistant at University of Houston Jan 2025 – Present
• Facilitated student learning and assessed assignments on programming, data visualization, and data mining techniques, ensuring code quality and conceptual understanding
Part-time Intern at Hangzhou Fudian Intelligent Information Technology Jul 2020 - Jun 2024
• Designed and developed iOS applications and web pages
• Applied computer vision algorithms to support real-world production scenarios

SELECTED PUBLICATIONS

- [1] **ChengAo Shen**, Ziming Zhao, Hanghang Tong, Dongjin Song, Dongsheng Luo, Qingsong Wen and Jingchao Ni, SVTime: Small Time Series Forecasting Models Informed by “Physics” of Large Vision Model Forecasters, arXiv:2510.09780, 2025
- [2] Ziming Zhao, **ChengAo Shen**, Hanghang Tong, Dongjin Song, Zhigang Deng, Qingsong Wen and Jingchao Ni, From Images to Signals: Are Large Vision Models Useful for Time Series Analysis?, arXiv:2505.24030, 2025
- [3] **ChengAo Shen**, Wenchao Yu, Ziming Zhao, Dongjin Song, Wei Cheng, Haifeng Chen and Jingchao Ni, Multi-Modal View Enhanced Large Vision Models for Long-Term Time Series Forecasting, NeurIPS, 2025
- [4] **ChengAo Shen**, Zhengzhang Chen, Dongsheng Luo, Dongkuan Xu, Haifeng Chen and Jingchao Ni, Exploring Multi-Modal Integration with Tool-Augmented LLM Agents for Precise Causal Discovery, Findings of ACL, 2025
- [5] Jingchao Ni, Ziming Zhao, **ChengAo Shen**, Hanghang Tong, Dongjin Song, Wei Cheng, Dongsheng Luo and Haifeng Chen, Harnessing Vision Models for Time Series Analysis: A Survey, IJCAI, 2025
- [6] **ChengAo Shen**, Siyuan Mu and Ge Diao, Emoji Kitchen with Controlled Fusion, The Second Tiny Papers Track at ICLR, 2024

RESEARCH EXPERIENCE

Small Time Series Forecasting Models Informed by LVMs

Jul 2025 – Oct 2025

Proposed SVTime, a lightweight framework that encodes the “physics” of Large Vision Models into compact architectures using linear layers and annealing constraint functions. Achieved state-of-the-art performance across 8 benchmarks, rivaling foundation models with $10^3\times$ fewer parameters and superior computational efficiency.

Multi-Modal View Enhanced Large Vision Models

Jan 2025 – May 2025

Proposed DMMV, a novel multi-modal framework that integrates numerical and visual views for long-term time series forecasting. Identified the inductive bias of Large Vision Models (LVMs) towards periodicity and developed a backcast-residual adaptive decomposition mechanism to optimally align visual and numerical forecasters. Outperformed 14 SOTA baselines across 8 benchmarks by effectively harnessing LVMs capabilities while mitigating their bias.

Multi-Modal Causal Discovery with Tool-Augmented LLM Agents

Aug 2024 – Dec 2024

Proposed MATMCD, a framework utilizing tool-augmented LLM agents to incorporate semantic cues from multi-modal data into causal graph learning. Demonstrated superior performance by reducing causal inference errors (NHD) by 66.7% and improving root cause analysis (MAP@10) by 83.3% compared to state-of-the-art baselines.

Action Recognition for Animals

Apr 2023 – Apr 2024

Optimized Video Swin-Transformer for animal action recognition, achieving a 30 mAP improvement on the Animal Kingdom benchmark. Built a custom pig behavior dataset and deployed a real-time monitoring system to automate farm surveillance.

Emoji Kitchen With Controlled Fusion

Nov 2023 – Dec 2023

Proposed the Controlled Fusion Network, a lightweight image fusion architecture capable of merging arbitrary numbers of input images while preserving semantic information. Collected a specialized dataset for emoji fusion and introduced a new evaluation task to validate the model’s low coupling and efficient semantic retention.

Intelligent Sensing based on Deep Learning

Nov 2022 – Apr 2023

Developed an intelligent sensing framework utilizing YOLOv8 to analyze fluorescent images, identifying chemical targets and quantifying luminescence changes. Deployed the deep learning model on a cloud server and integrated it into a WeChat application, significantly accelerating chemical experimentation by automating manual observation processes.

ACADEMIC AWARDS

NeurIPS Scholar Award

Neural Information Processing Systems Conference, 2025

Graduate Tuition Fellowship

University of Houston, 2025

Outstanding Student Award

Sichuan Agricultural University, 2024

PROFESSIONAL SERVICE

- Reviewer, AI4TS Workshop at Association for the Advancement of Artificial Intelligence (AAAI) 2026
- Reviewer, International Conference on Learning Representations (ICLR) 2026

SKILLS

Programming Proficient in Python; Experienced with Go and C++

Data Science Skilled in Numpy, Pytorch, Pandas etc.

Languages Chinese(native), English(fluent), Japanese(intermediate)