Chenyu Li

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Education

Tsinghua University **2021-2025**
Undergraduate in School of Software

- GPA: 3.91 / 4.00, Ranking: Top 10%
- Core Courses: Introduction to Artificial Intelligence(A+), Machine Learning(A), Calculus(A), Linear Algebra(A), Probability and Statistics(A), University Physics(A+), Physics for Scientists and Engineers(A), Practice of Programming(A), Foundation of Object-Oriented Programming(A), Students Research Training(A+)

Research Interest

My research interests primarily lie in the domains of **Deep Learning and Machine Learning**, with a focus on **sequence modeling**. I have experience applying machine learning techniques to **time series analysis** and **video generation**.

Centered at machine learning and sequence modeling, my long term research goal is to promote the application of machine learning in real sequence modeling scenarios. Concretely, I will be dedicated to the following topics:

- **Temporal modeling**: better method to capture temporal dependencies.
- **Intuitive physics**: generate videos that follow human physical commen sense.
- **Diffusion models**: diffusion models and fine-tuning algorithms.

Publications

(* indicates eqaul contribution)

- Timer: Generative Pre-trained Transformers Are Large Time Series Models
  Yong Liu*, Haoran Zhang*, **Chenyu Li***, Xiangdong Huang, Jianmin Wang, Mingsheng Long
  Forty-first International Conference on Machine Learning (ICML, 2024) [PDF][Code]

- Koopa: Learning Non-stationary Time Series Dynamics with Koopman Predictors
  Yong Liu*, **Chenyu Li***, Jianmin Wang, Mingsheng Long
  Thirty-seventh Conference on Neural Information Processing Systems (NeurIPS, 2023) [PDF][Code]

Research Experience

Intuitive Physics for Video Generation Models **Apr.2024 - Present**
Advisor: Saining Xie, Associate Professor, New York University

- Proposed Fine-tuning method and evaluation benchmark for image-to-video generation models in post-Sora background.
- Designed intuitive fine-tuning method based on reward gradients and designed reward models based on video segmentation models.
- Collected physics videos from different physical scenarios (i.e. object falling, rotating) and designed metrics for intuitve physics.
- In preparation for CVPR2025

Generative Pre-trained Transformers for Large Time Series Models **Aug.2023 - Apr.2024**
Advisor: Mingsheng Long, Associate Professor, Tsinghua University

- Developed **Timer**, a generative pre-trained Transformer designed for large-scale time series analysis, addressing various downstream tasks like forecasting, imputation, and anomaly detection.
- Curated large-scale datasets comprised of 1B time points and proposed a unified format for heterogeneous time series data, enabling **Timer** to adapt across different tasks and datasets while scaling up.
- Conducted experiments in real-world benchmarks for different tasks and demonstrated the ability to achieve state-of-the-art performance with few samples and zero-shot capability.
- Accepted by Forty-first International Conference on Machine Learning (ICML, 2024).

Apache IoTDB Artificial Intelligence Node **Jan.2023 - Dec.2023**
Advisor: Mingsheng Long, Associate Professor, Tsinghua University

- Participated in the development of IoTDB Artificial Intelligence Node, a native machine learning engine integrated into Apache IoTDB. Users build, train, manage and use machine learning models in IoTDB databases using SQL statements.
- Designed and implemented storage module and inference module(**core modules in Artificial Intelligence Node**), a unified inference framework which supports user-defined models(imported from local directory or huggingface) and built-in models for inference.
- Artificial Intelligence Node **has been released** at the IoTDB User Conference in December 2023 and **has been applied** in industrial production.

Non-stationary Time Series Forecasting with Koopman Predictors **Oct.2022 - Oct.2023**
Advisor: Mingsheng Long, Associate Professor, Tsinghua University

- Proposed Koopa as novel **Koop**man forec**a**ster for non-stationary time series forecasting based on modern Koopman theory.
- Devised the stackable structure of Koopa composed of modular Fourier Filter and Koopman Predictor, which can hierarchically disentangle and exploit time-invariant and time-variant dynamics for time series forecasting.
- Conducted experiments in six real-world benchmarks and demonstrated a competitive performance with state-of-the-art model while saving 77.3% average training time and 76.0% arverage memory usage.
- Accepted by Thirty-seventh Conference on Neural Information Processing Systems (NeurIPS, 2023).

Selected Honors and Awards

- National Scholarship (top scholarship in China; 0.2% domestically), Ministry of Education **2024**
- SenseTime AI Scholarship(30 undergraduates domestically), SenseTime **2023**
- Huawei Scholarship(Top 5%), Tsinghua University **2023**
- Software Innovation Competition(1st place), Tsinghua University **2023**
- 12·9 Scholarship(Top scholarship; 1 student per department), Tsinghua University **2022**
- National College Students Physics Competition(Second prize), Bejing Physical Society **2021**

Skills

- **Programming Languages**: Python, C/C++, Java, Javascript
- **Professional Software**: Pytorch, NumPy, Pandas, Git, LaTeX
- **Language**: Chinese(native), English(TOEFL iBT 107)