Junkai Lu

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Education

East China Normal University 2025 - present
Master Student in School of Data Science & Engineering, advised by Prof. Bin Yang *Shanghai, China*

Xi'an Polytechnic University 2021 - 2025
Bachelor Student of Software Engineering, Rank: 1/78 *Shaanxi, China*

Technical Skills & Research Interests

Languages: Python, Go, Java
Technologies: PyTorch, Django, Flask, Deepspeed, vLLM, LM Deploy, HuggingFace Transformers, LangChain, Ray
Interests: Artificial Intelligence, Large Language Model, Agent, Agentic System, Time Series Analysis

Experience

Huawei Noah's Ark Oct. 2025 – Present
Multimodal Perception & Multi-Agent Driven Time Series Modeling *Shanghai, China*

- Developing an interpretable multimodal Large Language Model for Time Series Question Answering.
- Engineering a multimodal framework integrating Time Series (TS) Encoders with LLM backbones. Implementing an alignment mechanism to bridge the semantic gap between numerical data and textual instructions.
- Designing a Hierarchical Reasoning mechanism that adaptively adjusts inference depth based on query complexity, optimizing computational efficiency for varied task difficulties.
- Addressing the lack of explainability in existing benchmarks by developing a Reverse Reasoning pipeline. Leveraged LLMs to backward-engineer logical trajectories from conclusions and implemented a self-reflection loop to iteratively refine and generate high-quality Chain-of-Thought datasets.
- Developing a hybrid training paradigm combining Supervised Fine-Tuning (SFT) with Reinforcement Learning. Utilized GRPO with a reward system to align the model's reasoning paths with human logic and improve robustness in complex forecasting scenarios.

Publications & Projects

TFB: A Benchmark of Time Series Forecasting Methods | ***1.6K Star***

- **One of the main contributors** of TFB, developing an open-source benchmark library for time series forecasting, addressing the lack of fair evaluation in existing studies.
- Integrated 30+ SOTA algorithms (covering Statistical, ML, and Deep Learning methods) and 8,000+ time series across 10 diverse domains.
- Achieved significant community impact with **1.6K+ GitHub Stars** and a **Best Paper Nomination** at PVLDB 2024, widely facilitating reproducible research in the time series field.

DTAF: A Non-Stationary Time Series Forecasting Model | ***CCF-A, AAAI 2026***

- Proposed a novel dual-branch framework (DTAF) to tackle **non-stationarity** in both temporal and frequency domains for robust time series forecasting.
- Designed a **Temporal Stabilizing Fusion (TFS)** module incorporating a **Mixture-of-Experts (MoE)** filter to disentangle and suppress non-stationary patterns.
- Developed a **Frequency Wave Modeling (FWM)** module utilizing spectral differencing to capture dynamic frequency drifts and periodic trends.
- Achieved **State-of-the-Art (SOTA)** performance on 11 real-world datasets, ranking **1st in 15/16 metrics** and reducing MSE by up to 50% against leading baselines like PatchTST.

PATRA: Pattern-Aware Time Series Reasoning and Alignment for Robust TSQA | ***CCF-A, ICML 2026, Under Review***

- Proposed **PATRA**, a Multimodal LLM framework bridging the gap between time series and text modality for reasoning.
- Designed a **Pattern-Aware Alignment** mechanism that disentangles time series into trend and seasonal components to ground semantic queries in time series data patterns.
- Implemented a novel **RL-Augmented Training** paradigm using **GRPO** and a unified Task-Aware Reward to prevent reward hacking and enhance Chain-of-Thought (CoT) reasoning.
- Achieved **SOTA** performance on the TSQA benchmark, outperforming GPT-4o and ChatTS across 4 tasks (**+13.79%** accuracy in Comprehension vs. textual models).