ZHIHENG LYU

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EDUCATION

University of Waterloo — 2024 - 2026
M.Math.(CompSc) in Computer Science — *Waterloo, ON, Canada*
- Supervised by Prof. Wenhu Chen

The University of Hong Kong — 2020 - 2024
B.Eng. in Computer Science, **First Class Honours degree** — *Hong Kong SAR, China*
- Entried 45th ICPC World Final; Got Two Gold Medals in ICPC Regional (Nanjing & Shanghai);

University of California, Berkeley — 2022 - 2023
Visiting Student for EECS Department — *Berkeley, CA, USA*

Shaoxing No.1 High School — 2017 - 2020
Honors Program in Innovation — *Shaoxing, Zhejiang, China*
- Got a Gold Medal at APIO2018 and a Siver Medal at NOI2018

WORK EXPERIENCE

M.Math.(Fully Funded) , UWaterloo TIGER Lab — Sept. 2024 – Now
Advisor: Prof. Wenhu Chen — *Waterloo, Canada*
- Core Developer of VerlTool [2], focusing on stateful tools such as Browser [1] and SWE-Sandbox for multi-turn agentic environments.
- Investigated reasoning mechanisms in vision-language models (VLMs) across modalities; developed benchmarks and visualizations to analyze attention and interpretability patterns [4].
- Explored weak supervision signals to enhance perception capabilities of VLMs in grounded environments; contributed to benchmark projects such as StructEval [6] and VideoScore [8].

Research Intern, UC Berkeley BAIR, NLP Group — Apr. 2023 – Aug. 2023
Advisors: Prof. Dan Klein & Dr. Kevin Yang — *Berkeley, USA*
- Proposed and implemented **FactTrack** [5], an algorithm that decomposes complex narratives into atomic facts and models dynamic world states for contradiction detection.
- Designed mechanisms for **inner-plot factual consistency checking** and **temporal fact tracking**, contributing to a broader narrative reasoning framework.

Research Intern, ETH Zürich NLPED & University of Michigan LIT — Jun 2022 – Oct. 2022
Advisors: Prof. Mrinmaya Sachan, Prof. Rada Mihalcea, & Dr. Zhijing Jin — Location: Zürich, Switzerland
- Analyzed large language models' understanding of causal relations using the Sentiment Dataset [11], exploring prompt-based causal reasoning [7].
- Designed and constructed the **corr2cause** dataset [9] to evaluate LLM causal inference; implemented bitmask dynamic programming and graph isomorphism in C++.
- Built and pre-processed benchmark datasets on "NLP for Social Good" [9][10][12], covering fairness, bias detection, and social impact evaluation.
- Led data cleaning, annotation design, and reproducible pipeline construction to ensure large-scale usability.

WORK EXPERIENCE

MiniMax — May. 2025 - Now
Research Scientist Intern at Base Model Team — *Shanghai, China*
- Conducted post-training research for Software Engineering (SWE) agents under the supervision of Qidi Wu and Pengyu Zhao.
- Led the design and implementation of a large-scale SWE data synthesis pipeline, generating over **36K verifiable tasks** from 5K+ sandbox environments. Achieved 64% Pass@1 on SWE-Verified and ranked **#2** on MultiSWE and TerminalBench (second only to Claude Sonnet 4.5) using the internal M2-Mini (100B–A10B) model.
- Rewrote **7k+ non-verifiable tasks** from GitHub Issues and Cursor queries to enhance dataset diversity and quality, using rule-based cleaning and generative reward modeling.
- Developed an **agentic RL framework for SWE-Bench** based on VerlTool, outperforming **SkyRL** on Qwen3-8B.
- Collaborated with the infra team to identify and resolve SWE sandbox performance bottlenecks, improving throughput by **80%** under fixed compute resources.
- Aligned the evaluation pipeline for **MiniMax-M1**[1], ensuring consistency between internal benchmarks and external leaderboard scores.

Capital Today Group — May. 2024 - Aug. 2024
Private Equity Research Intern — *Shanghai, China*
- Conduct private equity investment research for LLMs, Embodied AI, and AI Applications.

SELECTED PUBLICATIONS

1. Tao Yu*, Zhengbo Zhang*, **Zhiheng Lyu***, J. Gong, H. Yi, X. Wang, Y. Zhou, J. Yang, P. Nie, Y. Huang, W. Chen (2025). (Under Review) BrowserAgent: Building Web Agents with Human-Inspired Web Browsing Actions.
2. Dongfu Jiang*, Zhuofeng Li*, Yi Lu*, **Zhiheng Lyu***, Nie, P., Chen, W. (2025). VerlTool: A unified and easy-to-extend tool-agent training framework based on verl. (Open Source Project)
3. MiniMax. (2025). MiniMax-M1: Scaling Test-Time Compute Efficiently with Lightning Attention. (Technical Report)
4. **Zhiheng Lyu**, X. Ma, W. Chen (2025). (TMLR) *PixelWorld: Towards Perceiving Everything as Pixels.*
5. **Zhiheng Lyu**, Yang, K., Kong, L., Klein, D. (NAACL 2025 Oral). FACTTRACK: Time-Aware World State Tracking in Story Outlines.
6. Yang, J. et al. (Under Review). StructEval: Benchmarking LLMs' Capabilities to Generate Structural Outputs.
7. **Zhiheng Lyu***, Jin, Z.*, Mihalcea, R., Sachan, M., Schölkopf, B. (EMNLP 2024). Psychologically-Inspired Causal Prompts.
8. He, X. et al. (EMNLP 2024). Videoscore: Building automatic metrics to simulate fine-grained human feedback for video generation.
9. Jin, Z., Liu, J., **Zhiheng Lyu**, et al. (ICLR 2024). Can Large Language Models Infer Causation from Correlation?
10. Jin, Z.*, Chen, Y.*, Leeb, F.*, **Zhiheng Lyu**, et al. (NeurIPS 2023). CLADDER: Assessing Causal Reasoning in Language Models.
11. **Zhiheng Lyu***, Jin, Z.*, Sachan, M., Mihalcea, R., Schölkopf, B. (UAI 2022 Workshop). Can Large Language Models Distinguish Cause from Effect?
12. Jin, Z.*, Lalwani, A.*, Vaidhya, T., Shen, X., Ding, Y., **Zhiheng Lyu**, et al. (EMNLP 2022). Logical Fallacy Detection.

AWARDS & HONORS

1. Ranked 50 in **45th International Collegiate Programming Contest (ICPC) World Finals**, Dhaka, Bangladesh, Nov. 2022
2. 9th Place Team in **ICPC World Challenge for Real World Tasks**, Dhaka, Bangladesh, Nov. 2022
3. Gold Medalist and Team Captain in ICPC 2021 Shanghai region – ranked 20/668, Shanghai, China, Dec. 2021
4. Gold Medalist and Team Captain in ICPC 2020 Nanjing region – ranked 7/556, Nanjing, China, Dec. 2020
5. Silver Medalist at National Olympiad in Informatics (NOI) 2018, Changsha, China, Jul. 2018
6. Gold Medalist at The Asia-Pacific Informatics Olympiad (APIO) 2018, Beijing, China, Apr. 2018

LEADERSHIP EXPERIENCE

HKU AI4Good HKU, *Founder*	Sept 2023 - Jun 2024
AStar Team @ HKU, *Team Leader*	July 2021 - Aug 2022

PROFESSIONAL SERVICE

Reviewer, 2025 Conference on Neural Information Processing Systems, NeurIIPS 2025.
Reviewer, 2025 International Conference on Machine Learning, ICML 2025.
Co-organizer, a half-day workshop *Performance Optimization in the LLM world* @ ICPE 2024.
Reviewer, the 2024 Annual Conference of the Association for Computational Linguistics. ACL 2024.

SKILLS

Languages	English, Mandarin, Cantonese, Shanghainese, Classical Chinese
Programming Skills	Python, C/C++, Cursor
Technologies	verl, pytorch, Algorithms & Data Structure
Research Skills	LLM, NLP, Causality, RL, ⋯

REFERENCES

Wenhu Chen, Assistant Professor, Dept. of Computer Science, University of Waterloo
Kevin Yang, PhD, Berkeley AI Research, UC Berkeley & Scaled Cognition
Zhijing Jin, Assistant Professor, Dept. of Computer Science, University of Toronto
Prof. Dan Klein, Professor, Dept. of Computer Science, UC Berkeley
Prof. Mrinmaya Sachan, Assistant Professor, Dept. of Computer Science, ETH Zürich