ZILONG (RYAN) WANG

Ph.D., Computer Science, University of California San Diego

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RESEARCH FOCUS

- **Leading research on long CoT reasoning models:** Advancing LLM reasoning capabilities through supervised fine-tuning and reinforcement learning co-design with strategic data selection methodologies.
- **Key contributor to Amazon Shopping Agent:** Specialized in agentic data curation and reward system architecture for large-scale agentic reinforcement learning training pipelines.
- **Secure Code Generation:** Incorporating diverse and accurate reward feedback from static analysis, verification, and additional program analysis tools into the RLVR framework, enabling LLMs to generate functionally correct and security-aware code.

EDUCATION

Doctor of Philosophy in Computer Science   October 2020 – January 2025
University of California, San Diego
- Advisor: Professor Jingbo Shang
- Research Focus: Large language model agents, secure code generation, reinforcement learning

Bachelor of Science in Computer Science   September 2016 – June 2020
Peking University, Beijing, China
- Graduated Summa Cum Laude, Outstanding Graduate Recognition (Top 5%)

PROFESSIONAL EXPERIENCE

Applied Scientist   Present
Amazon, Rufus Team, Palo Alto, CA
- Leading research on long Chain-of-Thought reasoning models for complex problem solving
- Developing large-scale shopping agent systems with RL frameworks and internal search engines
- Designing and implementing agentic data curation pipelines to enhance agent performance and reliability

Research Scientist Intern   June 2024 – December 2024
Amazon, Nile Foundation Team, Palo Alto, CA
- Invented Reward Rising Optimization technique to increase RL data quality in multi-step agentic tasks
- Developed mechanisms for enforcing monotonically increasing reward signals during agent planning processes

Student Researcher   November 2023 – May 2024
Google Cloud AI Research & Google DeepMind
- Developed Speculative RAG framework using specialist models for parallel document-based draft generation
- Designed verification systems using generalist models, achieving 50.83% latency reduction across benchmarks
- Framework integrated into Google Cloud production systems for enterprise deployment

Student Researcher   April 2023 – September 2023
Google Cloud AI Research, Sunnyvale, CA
- Developed Chain-of-Table framework integrating tabular data explicitly within reasoning chains
- Implemented iterative table operations achieving state-of-the-art performance on WikiTQ, FeTaQA, and TabFact benchmarks
- Research deployed to Google Cloud production infrastructure serving enterprise customers

Student Researcher   June 2022 – September 2022
Google DeepMind, Mountain View, CA
- Created VRDU benchmark for multimodal document understanding across forms, receipts, and invoices
- Designed comprehensive evaluation metrics for spatial understanding and hierarchical information extraction

PUBLICATIONS

1. Learning to Optimize Multi-Objective Alignment Through Dynamic Reward Weighting
*Yining Lu, **Zilong (Ryan) Wang**, Shiyang Li, Xin Liu, Changlong Yu, Qingyu Yin, Zhan Shi, Zixuan Zhang, Meng Jiang*
Under review at **TACL**

2. ReaL: Training Language Models to Generate Quality Code with Program Analysis Feedback
Zilong (Ryan) Wang, Feng Yao*, Liyuan Liu, Junxia Cui, Li Zhong, Xiaohan Fu, Haohui Mai, Vish Krishnan, Jianfeng Gao, Jingbo Shang (*co-first authorship)*
Conference on Neural Information Processing Systems (**NeurIPS**) 2025

3. RRO: LLM Agent Optimization Through Rising Reward Trajectories
***Zilong (Ryan) Wang**, Jingfeng Yang, Sreyashi Nag, Samarth Varshney, Xianfeng Tang, Haoming Jiang, Jingbo Shang, Sheikh Muhammad Sarwar*
Conference on Language Modeling (**COLM**), 2025

4. Speculative RAG: Enhancing Retrieval Augmented Generation through Drafting
***Zilong (Ryan) Wang**, Zifeng Wang, Long Le, Huaixiu Steven Zheng, Swaroop Mishra, Vincent Perot, Yuwei Zhang, Anush Mattapalli, Ankur Taly, Jingbo Shang, Chen-Yu Lee, Tomas Pfister*
International Conference on Learning Representations (**ICLR**), 2025

5. TableRAG: Million-Token Table Understanding with Language Models
*Si-An Chen, Lesly Miculicich, Julian Martin Eisenschlos, Zifeng Wang, **Zilong (Ryan) Wang**, Yanfei Chen, Yasuhisa Fujii, Hsuan-Tien Lin, Chen-Yu Lee, Tomas Pfister*
Conference on Neural Information Processing Systems (**NeurIPS**), 2024

6. Chain-of-Table: Evolving Tables in the Reasoning Chain for Table Understanding
***Zilong (Ryan) Wang**, Hao Zhang, Chun-Liang Li, Julian Martin Eisenschlos, Vincent Perot, Zifeng Wang, Lesly Miculicich, Yasuhisa Fujii, Jingbo Shang, Chen-Yu Lee, Tomas Pfister*
International Conference on Learning Representations (**ICLR**), 2024

7. Debug like a human: A Large Language Model Debugger via Verifying Runtime Execution Step-by-step
*Li Zhong, **Zilong (Ryan) Wang**, Jingbo Shang*
Findings of the Association for Computational Linguistics (**ACL**), 2024

8. Answer is All You Need: Instruction-following Text Embedding via Answering the Question
*Letian Peng, **Zilong (Ryan) Wang**, Feng Yao, Zihan Wang, Jingbo Shang*
Annual Meeting of the Association for Computational Linguistics (**ACL**), 2024

9. LMDX: Language Model-based Document Information Extraction and Localization
*Vincent Perot, Kai Kang, Florian Luisier, Guolong Su, Xiaoyu Sun, Ramya Sree Boppana, **Zilong (Ryan) Wang**, Jiaqi Mu, Hao Zhang, Nan Hua*
Findings of the Association for Computational Linguistics (**ACL**), 2024

10. Can ChatGPT replace StackOverflow? A Study on Robustness and Reliability of Large Language Model Code Generation
*Li Zhong, **Zilong (Ryan) Wang***
The 38th Annual **AAAI** Conference on Artificial Intelligence (**AAAI**), 2023

11. Towards Zero-shot Relation Extraction in Web Mining: A Multimodal Approach with Relative XML Path
***Zilong (Ryan) Wang**, Jingbo Shang*
Findings of the Association for Computational Linguistics (**EMNLP**), 2023

12. VRDU: A Benchmark for Visually-rich Document Understanding
***Zilong (Ryan) Wang**, Yichao Zhou, Wei Wei, Chen-Yu Lee, Sandeep Tata*
Proceedings of the 29th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (**KDD**), 2023

13. MGDoc: Pre-training with Multi-granular Hierarchy for Document Image Understanding
***Zilong (Ryan) Wang**, Jiuxiang Gu, Chris Tensmeyer, Nikolaos Barmpalios, Ani Nenkova, Tong Sun, Jingbo Shang, Vlad I. Morariu*
Proceedings of the 2022 Conference on Empirical Methods in Natural Language Processing (**EMNLP**), 2022

14. **Formulating Few-shot Fine-tuning Towards Language Model Pre-training: A Pilot Study on Named Entity Recognition**
*Zihan Wang, Kewen Zhao, **Zilong (Ryan) Wang**, Jingbo Shang*
Findings of the Association for Computational Linguistics (**EMNLP**), 2022

15. **Towards Few-shot Entity Recognition in Document Images: A Label-aware Sequence-to-Sequence Framework**
***Zilong (Ryan) Wang**, Jingbo Shang*
Findings of the Association for Computational Linguistics (**ACL**), 2022

16. **LayoutReader: Pre-training of Text and Layout for Reading Order Detection**
***Zilong (Ryan) Wang**, Yiheng Xu, Lei Cui, Jingbo Shang, Furu Wei*
Proceedings of the 2021 Conference on Empirical Methods in Natural Language Processing (**EMNLP**), 2021

17. **DocStruct: A Multimodal Method to Extract Hierarchy Structure in Document for General Form Understanding**
***Zilong (Ryan) Wang**, Mingjie Zhan, Xuebo Liu, Ding Liang*
Findings of the Association for Computational Linguistics (**EMNLP**), 2020

18. **Exploring Semantic Capacity of Terms**
Jie Huang, **Zilong (Ryan) Wang***, Kevin Chang, Wen-mei Hwu, JinJun Xiong (*co-first authorship)*
Proceedings of the 2020 Conference on Empirical Methods in Natural Language Processing (**EMNLP**), 2020

HONORS & SERVICE

Academic Honors: UCSD Powell Fellowship (2020-2021), UCSD Jacob School of Engineering Fellowship (2020-2021)
Professional Service: Reviewer for **ICLR**, **NeurIPS**, **ICML**, **ACL**, **EMNLP**, **NAACL**, **CVPR**, **COLM**, **COLING**

Last updated: Sep 22, 2025