Yingru Li

szrlee@gmail.com https://richardli.xyz/

Interests: Reinforcement Learning, Optimization, Reasoning & Agent

Education

- **The Chinese University of Hong Kong (CUHK)**
  Ph.D. *in Computer Science and Information Engineering.* March 2025
  Supervisor: *Zhi-Quan (Tom) Luo* https://en.wikipedia.org/wiki/Zhi-Quan_Tom_Luo
  Committee: *Xinyun Chen*, *Baoxiang Wang*, *John C.S. Lui*, *Benjamin Van Roy (Stanford & DeepMind)*
- **Huazhong University of Science and Technology (HUST)** 2020
  B.E./M.S. *in Computer Science.* **1st/134 overall**, 1st/26 in Computer Theory and Software specialization.

Professional Experience

- **ByteDance**, Singapore 2025 June - present
  LLM Algorithm Research Scientist
- **Shenzhen Research Institute of Big Data**, Shenzhen, China 2023 - 2024
  Research Assistant
- **Tencent AI & Robotics X**, Shenzhen, China 2019 - 2022
  Student Research Staff Member in the Agent Center
- **Department of Computer Science, Cornell University**, Ithaca, NY 2017
  Undergraduate Research Assistant
- **Microsoft Research Lab** - Asia, Beijing, China 2016
  Research Intern in Theory Center

Representative Publications

1. Jiawei Wang, Jiacai Liu, Yuqian Fu, **Yingru Li**, Xintao Wang, Yuan Lin, Yu Yue, Lin Zhang, Yang Wang, and Ke Wang. "Harnessing Uncertainty: Entropy-Modulated Policy Gradients for Long-Horizon LLM Agents". In: *arXiv preprint arXiv:2509.09265* (2025).
2. Zhenghai Xue, Longtao Zheng, Qian Liu, **Yingru Li**, Xiaosen Zheng, Zejun Ma, and Bo An. "Simpletir: End-to-end reinforcement learning for multi-turn tool-integrated reasoning". In: *arXiv preprint arXiv:2509.02479* (2025).
3. **Yingru Li**. "Logit Dynamics in Softmax Policy Gradient Methods". In: *arXiv preprint arXiv:2506.12912* (2025).
4. Mengkang Hu, Yuhang Zhou, Wendong Fan, Yuzhou Nie, Bowei Xia, Tao Sun, Ziyu Ye, Zhaoxuan Jin, **Yingru Li**, Qiguang Chen, et al. "Owl: Optimized workforce learning for general multi-agent assistance in real-world task automation". In: *NeurIPS*. 2025.
5. **Yingru Li**, Jiawei Xu, Baoxiang Wang, and Zhi-Quan Luo. "Scalable Exploration via Ensemble++". In: *NeurIPS*. 2025.
6. **Yingru Li**, Jiawei Xu, Lei Han, and Zhi-Quan Luo. "Q-Star Meets Scalable Posterior Sampling: Bridging Theory and Practice via HyperAgent". In: *ICML*. 2024.
7. **Yingru Li** and Zhi-Quan Luo. "Prior-dependent analysis of posterior sampling reinforcement learning with function approximation". In: *AISTATS*. 2024.
8. Ziniu Li, **Yingru Li**, Yushun Zhang, Tong Zhang, and Zhi-Quan Luo. "HyperDQN: A Randomized Exploration Method for Deep Reinforcement Learning". In: *ICLR*. Correponding author. 2022.

9. Qing Wang, **Yingru Li**, Jiechao Xiong, and Tong Zhang. "Divergence-Augmented Policy Optimization". In: *NeurIPS*. Co-first author. 2019.

10. **Yingru Li**, Liangqi Liu, Hao Liang, Wenqiang Pu, and Zhi-Quan Luo. "Optimistic Thompson Sampling for No-Regret Learning in Unknown Games". In: *Under Review for IEEE Transactions on Signal Processing (TSP)* (2024). Presented at ICML 2023 Workshop "The Many Facets of Preference-Based Learning". arXiv: 2402.09456 [cs.LG].

11. **Yingru Li**. *Probability Tools for Sequential Random Projection*. Presented at ICML 2024 Workshop "High-dimensional Learning Dynamics 2024: The Emergence of Structure and Reasoning". 2024. arXiv: 2402.14026 [math.ST].

12. **Yingru Li**. *Simple, Unified Analysis of Johnson-Lindenstrauss with Applications*. Presented at ICML 2024 Workshop "High-dimensional Learning Dynamics 2024: The Emergence of Structure and Reasoning". arXiv: 2402.10232 [stat.ML].

13. Kun He, **Yingru Li**, Sucheta Soundarajan, and John E. Hopcroft. "Hidden community detection in social networks". In: *Information Sciences* 425 (2018). Correponding author, pp. 92–106. ISSN: 0020-0255.

14. Liangqi Liu, Wenqiang Pu, **Yingru Li**, Bo Jiu, and Zhi-Quan Luo. "Learning an Opponent-aware Anti-jamming Strategy via Online Convex Optimization". In: *Under Review for IEEE Transactions on Signal Processing (TSP)* (2024).

15. Liangqi Liu, Wenqiang Pu, **Yingru Li**, Bo Jiu, and Zhi-Quan Luo. "Radar Anti-Jamming Strategy Learning via Domain-Knowledge Enhanced Online Convex Optimization". In: *13th SAM*. IEEE, 2024.

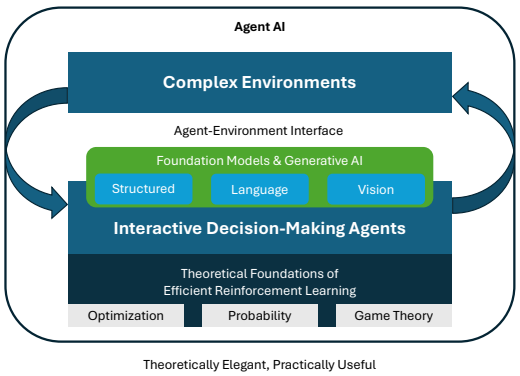
16. Fei Yu, **Yingru Li**, and Benyou Wang. *Scaling Flaws of Verifier-Guided Search in Mathematical Reasoning*. Correponding author. Presented at ICLR 2025 Workshops on: (1) Reasoning and Planning for Large Language Models; (2) Scaling Self-Improving Foundation Models without Human Supervision. 2025. arXiv: 2502.00271 [cs.CL].

17. Fei Yu, **Yingru Li**, and Benyou Wang. *Uncertainty-Aware Search and Value Models: Mitigating Search Scaling Flaws in LLMs*. 2025. arXiv: 2502.11155 [cs.AI].

Awards

- **Best Paper Award**, in the 3rd doctoral and postdoctoral Daoyuan academic forum, 2024.
- **Best Student Paper**, in IEEE Sensor Array and Multichannel Signal Processing Workshop, 2024.
- **SRIBD Ph.D. Fellowship** (Gold Class), by Shenzhen Research Institute of Big Data (SRIBD), 2023.
- **Presidential Ph.D. Fellowship**, by The Chinese University of Hong Kong, Shenzhen, 2019–2023.
- **Tencent AI Ph.D. Fellowship**, by Tencent & The Chinese University of Hong Kong, Shenzhen, 2018.
- **National Scholarship** (China) - Highest national academic honor, top 0.2% nationwide , 2018.
- **Qiming Star Award** (one of 5 recipients out of 7,112 undergraduates.), by Huazhong University of Science and Technology, 2016. **Media Reports**: [1] Newspaper. [2] HUST Online.
- **First Prize**, in Parallel computation and Application Contest (PAC) held by Intel and CCF, 2015.
- **First Prize**, in China National Mathematics Olympiad (Province-level Math League), 2012.

Research Vision



My research is driven by developing **trustworthy AI agents** that **interact** with complex, uncertain, human-in-the-loop environments. By advancing methods in **uncertainty quantification**, reinforcement learning (**RL**), and foundation model **reasoning & planning**, I bridge foundational theory with scalable algorithms and modern computational tools, addressing **feedback loop** and **data scarcity** in math and critical real-world domains like healthcare, robotics & finance. For further details, see research highlights.

Selected Oral Presentations

- **Tackling Data Scarcity for Trustworthy Agent**
  Invited talk at ETH, Zurich, Nov. 1, 2024.
- **Exploartion at Scale: Theory, Algorithms & Applications**
  a.k.a. "Scalable Uncertainty Quantification for Exploration and LLM Reasoning"
  Invited talk in 2024 INFORMS Annual Meeting, Seattle, Oct. 20, 2024.
  Invited talk at MIT, Jul. 30, 2024.
  Invited talk in International Symposium on Mathematical Programming (ISMP), Montréal, Jul. 25, 2024.
  Invited talk at RLChina.org, Jun. 25, 2024.
  Invited talk at Princeton University, May 2, 2024.
  Invited talk in INFORMS Optimization Society (IOS) Conference, Rice University, Mar. 23, 2024.
  Contributed talk, in the third doctoral and postdoctoral Daoyuan academic forum, Jan. 13, 2024.
- **No-Regret Learning in Unknown Game with Applications**
  Invited talk in RL Theory Student Workshop at Nanjing University, Aug. 23, 2022.
  Contributed Talk in the second doctoral and postdoctoral Daoyuan academic forum, Aug. 20, 2022.
- **HyperDQN: A Randomized Exploration Method for Deep Reinforcement Learning**
  Contributed Talk in NeurIPS Workshop Ecological Theory of Reinforcement Learning, Dec. 14, 2021

Academic Service

- **Reviewer** for Conference on Neural Information Processing Systems (NeurIPS) [12 papers], International Conference on Learning Representations (ICLR) [5 papers]; ICLR Workshop "Bridging the Gap Between Practice and Theory in Deep Learning" [4 papers], ICML Workshop "Aligning Reinforcement Learning Experimentalists and Theorists" [2 papers]. NeurIPS Workshop BDU Reviewers [2 papers]. AISTATS 2025 Conference Reviewers [2 papers] NeurIPS 2022 Workshop RL4RealLife [2 papers]
- **Chair** for RL Seminar in The Chinese University of Hong Kong, Shenzhen, China (Spring 2019, Summer 2020, Fall 2020, Spring 2021, Summer 2021, Fall 2021, Spring 2022, Fall 2022.); for 2 sessions in INFORMS Annual Meeting 2024 on "Integrating Generative AI with Sequential Decision-making".

Teaching

- **Stochastic Processes** (STA/DDA4001) — Fall 2018
- **Optimization II** (MAT3220) — Spring 2019
- **Distributed and Parallel Computing** (CSC4005) — Fall 2019
- **Reinforcement Learning** (DDA6105/CIE6023) — Fall 2020
- **Matrix Analysis** (CIE6002) — Spring 2021
- **Deep Learning and Their Applications** (MDS6224) — Spring 2022

My teaching duties include delivering weekly tutorials, correcting assignments, and running laboratory sessions when required, **all in English**.

Beyond Academia

I enjoy photography. I often play tennis and swim, and occasionally play golf. These activities allow me to live in the moment and help me find physical and spiritual freedom.