Yingru Li

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

Interests: Sequential Decision-making, Optimization, Probability, AI & Operations.

Education

- **The Chinese University of Hong Kong, Shenzhen**, China 2025 (expected)
  Ph.D. *in Computer Science and Information Engineering.*
  Supervisor: *Zhi-Quan (Tom) Luo* **Research**: https://richardli.xyz/#research
  Committee: *Jim Dai*, *Xinyun Chen*, *Baoxiang Wang*, *Benjamin Van Roy* (Stanford & Google DeepMind)
- **Huazhong University of Science and Technology**, Wuhan, China 2020
  M.S. *in Computer Science. With National Scholarship.*
- **Huazhong University of Science and Technology**, Wuhan, China 2017
  B.E. *in Computer Science (Honors Program). Outstanding Graduate.*

Professional Experience

- **Tencent AI & Robotics X**, Shenzhen, China 2019, 2020
  Research Intern in Agent Center
  Participate in the team project in high-throughput distributed Actor-Learner system for parallel on-policy roll-out and sample-efficient asynchronous reinforcement learning with off-policy data reuse.
- **SenseTime Research**, Peking, China 2018
  Computer Vision Trainee Researcher
  Work on incremental and continual learning system for multi-label image classification.
- **Department of Computer Science, Cornell University**, Ithaca, NY 2017
  Undergraduate Research Assistant
  Work with John E. Hopcroft on hidden community detection, a new graph concept for network analysis.
- **Microsoft Research Lab**, Asia 2016
  Research Intern in Theory Center
  Work on influence learning and maximization in social networks.
- **John Hopcroft Center on Computing Science**, Wuhan, China 2015-2017
  Undergraduate Research Assistant
  Lead reading group on machine learning and spectral graph algorithms. Work on network analysis.

Awards

- **Best Paper Award**, in the 3rd doctoral and postdoctoral Daoyuan academic forum, 2024.
- **Best Student Paper Award**, in the 13th 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.
- **Award of Excellence in Internship**, by Microsoft Research Lab, 2016.
- **Qiming Star Award (Selected as one of 5 recipients out of 7,112 undergraduates.)**, by Huazhong University of Science and Technology, 2016. **Reports**: [1] Newspaper. [2] HUST Online.
- **National Scholarship**, by Huazhong University of Science and Technology, 2018.
- **First Prize**, in Parallel computation and Application Contest (PAC) held by Intel and CCF, 2015.
- **First Prize**, in China National Mathematics Olympiad (Province level), 2013.

Selected Oral Presentations

- **GPT-HyperAgent: Adaptive Foundation Models for Online Decisions**
  Invited talk in 2024 INFORMS Annual Meeting, Seattle, Oct. 21, 2024.
- **HyperAgent: Advancing Scalable Exploration through Fast Uncertainty Estimation in RL**
  Invited talk in International Symposium on Mathematical Programming (ISMP), Montréal, Jul. 25, 2024.
- **HyperAgent: A Simple, Efficient and Scalable RL Framework for Complex Environments**
  a.k.a. "Q* meets Thompson Sampling: Scaling up Exploration via HyperAgent"
  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

Selected Research Publications

Preprints

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

2. **Yingru Li**, Liangqi Liu, Hao Liang, Wenqiang Pu, and Zhi-Quan Luo. *Optimistic Thompson Sampling for No-Regret Learning in Unknown Games*. Preprint. Presentation at ICML 2023 Workshop "The Many Facets of Preference-Based Learning". arXiv: 2402.09456 [cs.LG].

3. **Yingru Li**, Jiawei Xu, and Zhi-Quan Luo. *Adaptive Foundation Models for Online Decisions: HyperAgent with Fast Incremental Uncertainty Estimation*. Preprint. Presentation at ICML 2024 Workshops: (1) "Aligning Reinforcement Learning Experimentalists and Theorists"; (2) "Automated Reinforcement Learning: Exploring Meta-Learning, AutoML, and LLMs".

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

Conference Proceedings

5. **Yingru Li** and Zhi-Quan Luo. "Prior-dependent analysis of posterior sampling reinforcement learning with function approximation". In: *The 27th International Conference on Artificial Intelligence and Statistics (AISTATS)*. 2024. arXiv: 2403.11175 [stat.ML].

6. **Yingru Li**, Jiawei Xu, Lei Han, and Zhi-Quan Luo. "Q-Star Meets Scalable Posterior Sampling: Bridging Theory and Practice via HyperAgent". In: *The 41st International Conference on Machine Learning (ICML)*. Proceedings of Machine Learning Research. 2024. arXiv: 2402.10228 [cs.LG].

7. 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: *2024 IEEE 13th Sensor Array and Multichannel Signal Processing Workshop (SAM)*. IEEE. 2024. arXiv: 2402.16274 [eess.SP].

8. Ziniu Li, **Yingru Li**, Yushun Zhang, Tong Zhang, and Zhi-Quan Luo. "HyperDQN: A Randomized Exploration Method for Deep Reinforcement Learning". In: *International Conference on Learning Representations (ICLR)*. 2022. URL: https://openreview.net/pdf?id=X0nrKAXu7g-.

9. Qing Wang, **Yingru Li**, Jiechao Xiong, and Tong Zhang. "Divergence-Augmented Policy Optimization". In: *Advances in Neural Information Processing Systems (NeurIPS)*. Vol. 32. Curran Associates, Inc., 2019. URL: https://openreview.net/pdf?id=rylacVSeIS.

Journal Articles

10. Kun He, **Yingru Li**, Sucheta Soundarajan, and John E. Hopcroft. "Hidden community detection in social networks". In: *Information Sciences* 425 (2018), pp. 92–106. ISSN: 0020-0255. DOI: https://doi.org/10.1016/j.ins.2017.10.019.

Under Preparation

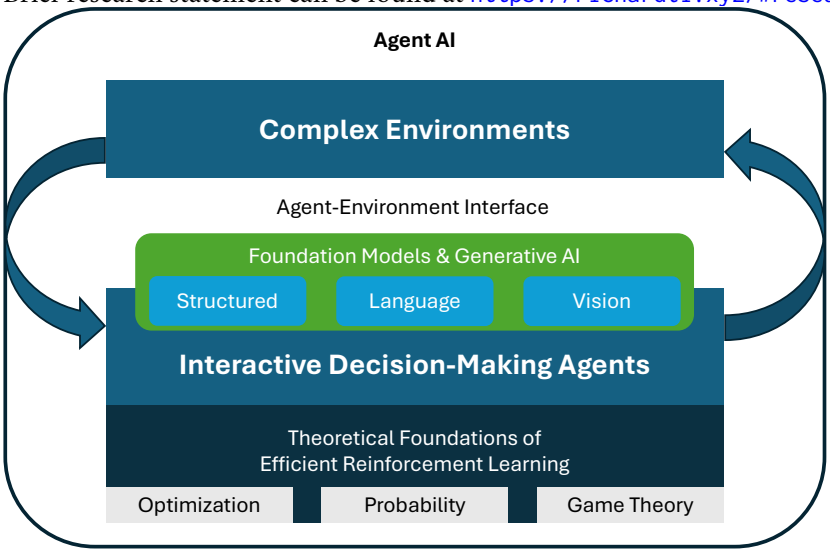
11. **Yingru Li**, Xiangbo Wu, Yanchuan Tang, Xiang Wan, Benyou Wang, and Zhi-Quan Luo. "Uncertainty-aware Vision-Language Agents for Multi-turn Medical Decision-making". under preparation. 2024.

12. **Yingru Li**, Jiawei Xu, Xiangbo Wu, Anningzhe Gao, Baoxiang Wang, Benyou Wang, and Zhi-Quan Luo. "Controlled Decoding via Q-Star on Outcome Feedback for Language Models". under preparation. 2024.

13. Liangqi Liu, Wenqiang Pu, **Yingru Li**, Bo Jiu, and Zhi-Quan Luo. "Learning an Opponent-aware Anti-jamming Strategy via Online Convex Optimization". Extended version of "Radar Anti-jamming Strategy Learning via Domain-knowledge Enhanced Online Convex Optimization". 2024.

Research Highlight

I focus on algorithms and theory for interactive agents that operate in complex and uncertain environments. This work necessitates advancements in methods for knowledge and uncertainty representation, exploration, adaptation, and decision-making. To achieve these goals, I use and develop fundamental tools in Math & CS. The methods developed have been applied to gaming, human-AI alignment, and reliable & safe operations. Brief research statement can be found at https://richardli.xyz/#research.



Theoretically Elegant, Practically Useful

Academic Service

- **Reviewer** for Conference on Neural Information Processing Systems (NeurIPS) [12 papers], International Conference on Learning Representations (ICLR) [2 papers]; ICLR Workshop "Bridging the Gap Between Practice and Theory in Deep Learning" (2 papers), ICML Workshop "Aligning Reinforcement Learning Experimentalists and Theorists" (2 papers).

Academic Service (continued)

- **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.