

**Interests:** Decision Making Under Uncertainty, Reinforcement & Active Learning, LLM Reasoning & Agent

## Education

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

## Professional Experience

- **Shenzhen Research Institute of Big Data, Shenzhen, China** 2023 - present  
*Research Assistant*
  - Innovated game-theoretic algorithms for signal sensing, earning **Best Student Paper Award**.
  - Contributed to HuatuoGPT agent for outpatient referral and navigation via multi-turn dialogues, now operational in 12 hospitals.
- **Tencent AI & Robotics X, Shenzhen, China** 2019 - 2022  
*Research Intern, Agent Center. Topic: Data-efficient Reinforcement Learning (RL)*
  - High-throughput distributed actor-learner system. Stable off-policy policy optimization (NeurIPS).
  - Develop HyperAgent on scalable exploration & uncertainty estimation for Deep RL, achieving 7x data efficiency and 20x computation reduction. (Published in ICML; **Best Paper** in 2024 Daoyuan forum).
- **Department of Computer Science, Cornell University, Ithaca, NY** 2017  
*Undergraduate Research Assistant*

Spearheaded research in hidden community detection, a novel graph-theoretic concept, with Turing award winner John E. Hopcroft. (Published in Information Sciences)
- **Microsoft Research Lab, Asia** 2016  
*Research Intern in Theory Center*

Influence maximization and learning in social networks. Received Award of Excellence in Internship.

## Representative Publications

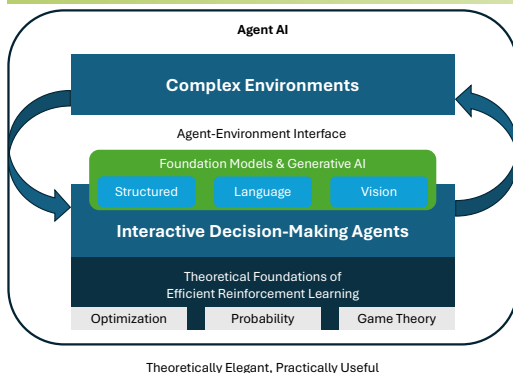
- 1 **Yingru Li**, Fei Yu, and Benyou Wang. "Uncertainty-Aware Search: Mitigating Test-Time Search Scaling Flaws in LLMs". To be released soon. 2024.
- 2 **Yingru Li**, Xuheng Shen, Gehan Hu, Xiaoxiao Liu, Benyou Wang, and Zhi-Quan Luo. "Proactive Agents for Multi-turn Hospital Outpatient Referral under Uncertainty". To be released soon. 2024.
- 3 **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.
- 4 **Yingru Li** and Zhi-Quan Luo. "Prior-dependent analysis of posterior sampling reinforcement learning with function approximation". In: *AISTATS*. 2024.
- 5 **Yingru Li**, Jiawei Xu, Baoxiang Wang, and Zhi-Quan Luo. *Scalable Exploration via Ensemble++*. Preprint. An early version presented at ICML 2024 Workshops: (1) "Aligning Reinforcement Learning Experimentalists and Theorists"; (2) "Automated Reinforcement Learning: Exploring Meta-Learning, AutoML, and LLMs". arXiv: [2407.13195](https://arxiv.org/abs/2407.13195) [cs.LG].

- 6 Ziniu Li, **Yingru Li**, Yushun Zhang, Tong Zhang, and Zhi-Quan Luo. "HyperDQN: A Randomized Exploration Method for Deep Reinforcement Learning". In: *ICLR*. Corresponding author. 2022.
- 7 Qing Wang, **Yingru Li**, Jiechao Xiong, and Tong Zhang. "Divergence-Augmented Policy Optimization". In: *NeurIPS*. Co-first author. 2019.
- 8 **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](https://arxiv.org/abs/2402.09456) [cs.LG].
- 9 **Yingru Li**. *Probability Tools for Sequential Random Projection*. Preprint. Presented at ICML 2024 Workshop "High-dimensional Learning Dynamics 2024: The Emergence of Structure and Reasoning". 2024. arXiv: [2402.14026](https://arxiv.org/abs/2402.14026) [math.ST].
- 10 **Yingru Li**. *Simple, Unified Analysis of Johnson-Lindenstrauss with Applications*. Preprint. Presented at ICML 2024 Workshop "High-dimensional Learning Dynamics 2024: The Emergence of Structure and Reasoning". arXiv: [2402.10232](https://arxiv.org/abs/2402.10232) [stat.ML].
- 11 Kun He, **Yingru Li**, Sucheta Soundarajan, and John E. Hopcroft. "Hidden community detection in social networks". In: *Information Sciences* 425 (2018). Corresponding author, pp. 92–106. ISSN: 0020-0255.   
URL: <https://www.sciencedirect.com/science/article/pii/S0020025517310101>.

## 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 (LLM) **reasoning & planning**, I bridge foundational theory with scalable algorithms and modern computational tools, addressing **feedback loop** and **data scarcity** in math, coding and critical real-world domains like healthcare, robotics & finance. For further details, see my [research highlights](#).

## Selected Oral Presentations

- **Tackling Data Scarcity for Trustworthy Agent**  
*Invited talk* at ETH, Zurich, Nov. 1, 2024.

## Selected Oral Presentations (continued)

### ■ **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" [2 papers], ICML Workshop "Aligning Reinforcement Learning Experimentalists and Theorists" [2 papers]. NeurIPS Workshop BDU Reviewers [2 papers]. AISTATS 2025 Conference Reviewers [1 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

- |   |             |
|---|-------------|
| ■ <b>Stochastic Processes</b> (STA/DDA4001)             | Fall 2018   |
| ■ <b>Optimization II</b> (MAT3220)                      | Spring 2019 |
| ■ <b>Distributed and Parallel Computing</b> (CSC4005)   | Fall 2019   |
| ■ <b>Reinforcement Learning</b> (DDA6105/CIE6023)       | Fall 2020   |
| ■ <b>Matrix Analysis</b> (CIE6002)                      | Spring 2021 |
| ■ <b>Deep Learning and Their Applications</b> (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.