Ruizhe Shi

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Education

Tsinghua University, Beijing, China **Sept. 2021 – Present**

*Undergraduate at Special Pilot Class in Computer Science (**Yao class**)*

- Major: *Computer Science and Technology* *GPA 3.93/4.00*
- Minor: *Chinese Language and Literature* *GPA 4.00/4.00*

University of Washington, Seattle, USA **Feb. 2024 – July 2024**

Research Visitor at Paul G. Allen School of Computer Science

Publications & Manuscripts

(∗ *indicates equal contribution.*)

[5] **(Manuscript)** Ruizhe Shi*, Runlong Zhou*, Simon S. Du. "The Crucial Role of Samplers in Online Direct Preference Optimization".[link]

[4] **(NeurIPS 2024)** Ruizhe Shi, Yifang Chen, Yushi Hu, Alisa Liu, Hannaneh Hajishirzi, Noah A. Smith, Simon S. Du. "Decoding-Time Language Model Alignment with Multiple Objectives".[link]

[3] **(ICML 2024)** Chenhao Lu, Ruizhe Shi*, Yuyao Liu*, Kaizhe Hu, Simon S. Du, Huazhe Xu. "Rethinking Transformers in Solving POMDPs".[link]

[2] **(ICLR 2024)** Ruizhe Shi*, Yuyao Liu*, Yanjie Ze, Simon S. Du, Huazhe Xu. "Unleashing the Power of Pre-trained Language Models for Offline Reinforcement Learning".[link]

[1] **(NeurIPS 2023)** Yanjie Ze, Yuyao Liu*, Ruizhe Shi*, Jiaxin Qin, Zhecheng Yuan, Jiashun Wang, Huazhe Xu. "H-InDex: Visual Reinforcement Learning with Hand-Informed Representations for Dexterous Manipulation".[link]

Research Experiences

Optimization Theory of Online DPO **May 2024 – Sept. 2024**

Supervised by Prof. Simon S. Du *CSE, University of Washington*

- We study convergence rates of (online) DPO from optimization perspective, and show the impact of samplers through a theoretical separation and empirical experiments. First-authored work under review.

Multi-objective Language Model Alignment **Dec. 2023 – May 2024**

Supervised by Prof. Simon S. Du *CSE, University of Washington*

- We propose a training-free, simple yet effective decoding-time algorithm for multi-objective alignment of language models, with optimality guarantees. First-authored work accepted by **NeurIPS 2024**.

Representation Theory of Transformer in Decision-making **Nov. 2023 – Jan. 2024**

Supervised by Prof. Huazhe Xu *IIIS, Tsinghua University*

- We challenge the common wisdom and prove theoretically and empirically that Transformers are not suitable for Partially Observable RL, while advocating Linear RNN as a promising alternative. Accepted by **ICML 2024**.

Tuning Pre-trained Language Model for Decision-making **June 2023 – Sept. 2023**

Supervised by Prof. Huazhe Xu *IIIS, Tsinghua University*

- We leverage the power of pre-trained Language Models for solving decision-making problems. First-authored work accepted by **ICLR 2024**.

Pre-trained Visual Representation for Decision-making **Mar. 2023 – May 2023**

Supervised by Prof. Huazhe Xu *IIIS, Tsinghua University*

- We propose H-InDex, a hand-informed visual representation for dexterous manipulation with reinforcement learning. Accepted by **NeurIPS 2023.**

Awards & Honors

First-level Comprehensive Scholarship **Nov. 2024**

Tsinghua University *top scholarship*

Yao Award (Silver Medal) **Sept. 2024**

IIIS, Tsinghua University *top scholarship [link]; 3 students institute-wide*

Jiang Nanxiang Scholarship **Nov. 2023**

Tsinghua University *top scholarship; 1 student institute-wide*

China National Endeavor Scholarship **Oct. 2022**
Beijing Education Bureau *1 student institute-wide*

First Prize in National High School's Mathematics Competition of China **Oct. 2020**
Chinese Mathematical Society *top 20 province-wide*

Service

Conference Reviewer
NeurIPS 2024 (Top Reviewer [link]), ICLR 2025, AISTATS 2025

Yao Class Seminar Co-organizer **2024 Fall – Present**
Co-organize weekly research seminars [link] *Tsinghua University*

Teaching Assistant **2024 Fall**
Natural Language Processing *Tsinghua University*

Voluntary Drop-in Tutoring **Oct. 2022 – July 2024**
Tutor freshmen in basic courses *Tsinghua University*

*I have **157** hours of officially recorded volunteering work.*

Selected Courses

Mathematics and Theory: Calculus (**A**$^+$), Linear Algebra (**A**), Abstract Algebra (**A**), Introduction to Complex Analysis (**A**), Probability and Statistics (**A**), Basic Topology (**93**), Introduction to Optimization (**A**), Theory of Computation (**A**), Physics of Information (**A**);
Programming and AI: Introduction to Programming in C/C++ (**A**$^+$), Type-safe Modern System Practice (**A**), Machine Learning (**A**), Artificial Intelligence: Principles and Techniques (**A**), Natural Language Processing (**A**).

Technical Skills

Programming Skills: Python, C/C++, LaTeX, Bash, Scala, Matlab.
Language Skills: Chinese Mandarin (native), English (TOEFL 104 [R30/L26/S23/W25], GRE 327+3.5 [V157/Q170]).

Links

Top reviewer: https://nips.cc/Conferences/2024/ProgramCommittee#top-reviewers
Yao class seminar: https://group.iiis.tsinghua.edu.cn/~stu/seminar/
Yao award: https://iiis.tsinghua.edu.cn/en/list-673-1.html
Publications:
[5] https://arxiv.org/pdf/2409.19605
[4] https://arxiv.org/pdf/2406.18853
[3] https://arxiv.org/pdf/2405.17358
[2] https://lamo2023.github.io
[1] https://yanjieze.com/H-InDex/