Runlong Zhou (周润龙)

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January 16, 2024

Research Interests

- Emphasis on reinforcement learning theory

- Applied machine learning and reinforcement learning

Education

- **University of Washington**
  PhD, Paul G. Allen School of Computer Science & Engineering, advised by Prof. Simon S. Du — Seattle, USA
  2022.9 - Now (Est. 2027.8)

- **Tsinghua University**
  BEng, Special Pilot CS Class (Yaoclass), Institute for Interdisciplinary Information Sciences (IIIS) — Beijing, China
  GPA: 3.84 (overall) / 3.89 (major) over scale 4.0, Rank: 16 / 54
  2018.8 - 2022.6

Academic Experience

- **Microsoft Research**
  Research intern with Dr. Beibin Li — Redmond, USA
  2023.6 - 2023.9

- **University of Washington**
  Research intern with Prof. Simon S. Du — Virtual
  2020.9 - 2022.9

- **Facebook AI Research**
  Research intern with Dr. Alessandro Lazaric and Dr. Matteo Pirotta — Virtual
  2021.3 - 2021.5

Publications

* denotes equal contribution or alphabetical ordering.

1. **Free from Bellman Completeness: Trajectory Stitching via Model-based Return-conditioned Supervised Learning** [Link]
   Zhaoyi Zhou, Chuning Zhu, **Runlong Zhou**, Qiwen Cui, Abhishek Gupta, Simon Shaolei Du
   ICML 2024   Poster
   We study the strengths and weaknesses of return-conditioned supervised learning, and propose an empirically improved algorithm.

2. **Sharp Variance-Dependent Bounds in Reinforcement Learning: Best of Both Worlds in Stochastic and Deterministic Environments** [Link]
   Runlong Zhou, Zihan Zhang, Simon S. Du
   ICML 2023   Poster
   We provide a systematic study of variance-dependent regret bounds of model-based and model-free reinforcement learning for tabular MDPs. The proposed model-based algorithm is both optimal for stochastic and deterministic MDPs.

3. **Variance-Dependent and Horizon-Free Reinforcement Learning for Latent Markov Decision Processes** [Link]
   Runlong Zhou, Ruosong Wang, Simon S. Du
   ICML 2023   Poster
   We provide an algorithm framework for Latent MDPs (with context in hindsight), achieving the first horizon-free minimax regret. We complement the study by giving a novel regret lower bound for LMDPs using the symmetrization technique.

4. **Understanding Curriculum Learning in Policy Optimization for Online Combinatorial Optimization** [Link]
   Runlong Zhou, Zelin He, Yuandong Tian, Yi Wu, Simon S. Du
   TMLR
   We formulate of canonical online Combinatorial Optimization problems as Latent MDPs and give convergence guarantee of Natural Policy Gradient on LMDPs. We show effectiveness of Curriculum Learning through the perspective of relative conditional number.
5. **Stochastic Shortest Path: Minimax, Parameter-Free and Towards Horizon-Free Regret** [Link]
   Jean Tarbouriech*, **Runlong Zhou***, Simon S. Du, Matteo Pirotta, Michal Valko, Alessandro Lazaric
   NeurIPS 2021   Spotlight, 3% acceptance rate
   We propose an algorithm (EB-SSP) for SSP problems, which is the first to achieve minimax optimal regret while being parameter-free.

Ongoing Projects

1. **Decision Transformer Theories**
   Advised by Prof. Simon Du
   We aim to give hardness and separation results of the empirically successful Decision Transformer.
2. **Reinforcement Learning Finetuning for Language Models**
   Advised by Dr. Beibin Li and Prof. Simon Du
   We apply language models to a document retrieval application and use reinforcement learning techniques for finetuning.

Awards, Grants & Honors

- **Undergraduate:**

IIIS Outstanding Graduate	2022
The 2021 China Collegiate Programming Contest, Guilin Site (Gold Medal)	2021
IIIS Research Innovation Scholarship	2021
IIIS Academic Performance Scholarship	2021
Tsinghua University Air Rifle Competition (First Place)	2021
The 2019 ACM-ICPC Asia Regional Contest, Xuzhou Site (Gold Medal)	2019
The 2018 ACM-ICPC Asia Regional Contest, Beijing Site (Gold Medal)	2018

- **Secondary school:**

The 34th National Olympiad in Informatics (Silver Medal)	2017
China Team Selection Competition 2017 (Gold Medal)	2017
The 2016 ACM-ICPC Asia CHINA-Final Contest (Gold Medal)	2016
The 2016 China Collegiate Programming Contest Finals (Silver Medal)	2016
The 33rd National Olympiad in Informatics (Silver Medal)	2016

Past Projects

If hyperlink not applicable, please refer to my GitHub page.

1. **RhythmicSpeechSongAligner** [Link]
   Runlong Zhou*, Zhui Zhu*
   Multimedia Computing course project   python
   Create visually-rhythmic videos by matching each lyric with a video clip which has similar semantic meaning
2. **GodScanner** [Link]
   Rui Shen*, Heyang Zhao*, **Runlong Zhou***
   Deep Learning course project   python
   Transfer a photo of file into its scanned style (flatten, shadow and watermark removal)

3. **Ray Tracing Renderer** [Link]
   Runlong Zhou
   Advanced Computer Graphics course project   C++
   Optimized path tracing framework supporting Mitsuba configurations, many textures and sampling methods

4. **Texas Hold'em Agent** [Link]
   Runlong Zhou
   Game Theory course project   C++
   A smart Texas hold'em agent

5. **IconAdapter** [Link]
   Kailu Wu*, **Runlong Zhou***
   Machine Learning course project   python
   Transfer icon styles to match mobile UI themes

Miscellanea

- **Professional skills:** Algorithm design, Data structures, Deep (Reinforcement) learning

- **Programming skills:** C++ / C, python , LaTeX, **CUDA** , **Java**™ , MATLAB®

- **Hobbies:** Air rifle / pistol shooting, Archery

- **Service:** Teaching Olympiad in Informatics to secondary school students between 2018 and 2021. Reviewer of ICML 2022, NeurIPS 2022. Teaching assistant of UW CSE 543 Deep Learning.