Dake Bu

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RESEARCH INTEREST

Deep Learning Theory; Distribution Optimization; Mean-Field Optimization; Reinforcement Learning

WORK EXPERIENCES

Centre for Frontier AI and Research, A*STAR, Research Intern   Dec. *2025 – Present*

- Working on theoretical research on theoretical foundation of deep learning. PI: Atsushi Nitanda.

RIKEN Center for Advanced Intelligence Project, Research Intern   Dec. *2024 – Oct. 2025*

- Working on theoretical research as a member of Deep Learning Theory Team. PI: Taiji Suzuki.

EDUCATION BACKGROUND

Department of Computer Science, City University of Hong Kong (CityUHK)   *Oct. 2023 – Present*

Ph.D. | GPA: 3.92/4.0

Major: Computer Science | Supervisors: Hau-san Wong, Qingfu Zhang   Hong Kong SAR

School of Mathematics and Statistics, Xi'an Jiaotong University (XJTU)   *Aug. 2019 – Jun.2023*

B.Sc. | GPA: 86.62/100

Major: Information and Computational Science | Supervisors: Hui Li, Jian Sun   Xi'an, Shaanxi, PRC

RESEARCH OUTPUTS

1. **Dake Bu**, Wei Huang, Andi Han, Atsushi Nitanda, Qingfu Zhang, Hau-San Wong, and Taiji Suzuki. Provable Benefit of Curriculum in Transformer Tree-Reasoning Post-Training.

2. **Dake Bu**, Wei Huang, Andi Han, Atsushi Nitanda, Qingfu Zhang, Hau-San Wong, and Taiji Suzuki. Consistency Is Not Always Correct: Towards Understanding the Role of Exploration in Post-Training Reasoning.

3. **Dake Bu**, Wei Huang, Andi Han, Atsushi Nitanda, Qingfu Zhang, Hau-San Wong, and Taiji Suzuki. Provable In-Context Vector Arithmetic via Retrieving Task Concepts. The 42nd International Conference on Machine Learning (**ICML2025**).

4. Bo Xue, **Dake Bu**, Ji Cheng, Yuanyu Wan, Qingfu Zhang. Multi-objective Linear Reinforcement Learning with Lexicographic Rewards. The 42nd International Conference on Machine Learning (**ICML2025**).

5. **Dake Bu**, Wei Huang, Andi Han, Atsushi Nitanda, Taiji Suzuki, Qingfu Zhang, Hau-San Wong: Provably Transformers Harness Multi-Concept Word Semantics for Efficient In-Context Learning. Advances in Neural Information Processing Systems 37 (**NeurIPS 2024**).

6. **Dake Bu**, Wei Huang, Taiji Suzuki, Ji Cheng, Qingfu Zhang, Zhiqiang Xu, Hau-San Wong: Provably Neural Active Learning

Succeeds via Prioritizing Perplexing Samples. (**ICML2024**).

HONORARY AWARDS

- Research Tuition Scholarship - CityUHK (Top 5%) *2024-2025*
- Outstanding Academic Performance Award for Research Degree Students - CityUHK (Top 10%) *2023-2024*
- Postgraduate Studentship - Hong Kong Government (for excellent non-local student) *2023-2025*
- Advanced Individual - XJTU (Top 1%) *2021-2022*
- School-level Scholarship - XJTU (Top 15%) *2020-2022*
- Merit Student - XJTU (Top 20%) *2019-2020*

TEACHING EXPERIENCES

CS3483 Multimodal Interface Design, Teaching Assistant *2023/24 Semester B*

- Held tutorials and graded assignments.

CS3481 Fundamentals of Data Science, Teaching Assistant *2024/25 Semester A*

- Held tutorials and graded assignments.

SKILLS & ABILITIES

Software Skills: MATLAB, Latex (Tex studio), Pytorch, Microsoft office & WPS, Power Point, Pycharm, Photo Shop, Excel

Programming Skills: Python, Java, C, C++, SQL, HTML, JavaScript, MATLAB.

Language: English: Fluent (TOEFL 109), Japanese: Basic, Mandarin: Native.

Art Skills: Brush Calligraphy (Amateur level 8), Guitar, Board Painting.