Shaolong Li

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Education

University of Michigan, Ann Arbor **Sep. 2025 – Jun. 2027 (Expected)**
M.S. in Computer Science and Engineering

Central South University (CSU) **Sep. 2020 – Jun. 2024**
B.S. in Computer Science and Technology

- GPA: 93.95/100, Rank: 1/235

Publications

(* stands for equal contribution.)

Mixed Sparsity Training: Achieving 4× FLOP Reduction for Transformer Pretraining [PDF]
Pihe Hu*, **Shaolong Li***, Xun Wang, and Longbo Huang
In Transactions on Machine Learning Research (TMLR).

Value-Based Deep Multi-Agent Reinforcement Learning with Dynamic Sparse Training [PDF]
Pihe Hu*, **Shaolong Li***, Zhuoran Li, Ling Pan, and Longbo Huang
In Annual Conference on Neural Information Processing Systems (NeurIPS), 2024.

Research Experience

AIMING Lab at the University of North Carolina at Chapel Hill Sep. 2024 – Dec. 2024
Research Assistant supervised by Prof. Huaxiu Yao

Research on Multimodal Alignment for Multimodal Models

- Proposed a multimodal Direct Preference Optimization (DPO) framework to align models using interleaved image-text data, enhancing their ability to generate mixed-modality outputs.
- Applied step-level reasoning by segmenting interleaved content into modality-aware steps to improve alignment supervision.

Research on Step Reasoning for Large Language Models (LLMs)

- Extended DPO to step-level preference pairs to enhance multi-step mathematical reasoning.
- Built a step-level dataset by sampling, decomposing, and pairing responses based on per-step correctness.
- Incorporated a value function to assess step-wise context quality for finer-grained decisions.

Decision Intelligence Lab at Tsinghua University Jul. 2023 – Jun. 2024
Research Assistant supervised by Prof. Longbo Huang

Research on Sparse Pretraining for Large Language Models (LLMs)

- Introduced an innovative pretraining method that cuts down about 75% of Floating Point Operations while preserving LLM performance.
- Applied dynamic sparse training with varying sparsity patterns to reduce the computational cost of forward and backward propagation.
- Proposed a Mixed-Growing topology evolution strategy to expand parameter utilization and escape suboptimal solution spaces.

Research on Sparse Training for Multi-Agent Reinforcement Learning

- Designed a Multi-Agent Sparse Training Framework achieving up to 20× FLOP and model size reduction with <3% performance drop.
- Enhanced TD target reliability under extreme sparsity via gradient-based topology evolution and a Hybrid TD scheme.
- Improved value estimation by combining Dual Buffers with Soft Mellowmax to mitigate DQN overestimation.

Skills

- **Language:** English, Chinese.
- **Programming:** Python, Pytorch, C, C++, Java, MATLAB, HTML/CSS/Javascript, Shell, TEX, Verilog.
- **Toolsets:** Docker, Git, Linux.

Awards and Scholarships

◦ Outstanding Graduate, CSU	Mar. 2024
◦ Ruiwei Scholarship	Oct. 2023
◦ Outstanding Student, CSU	Dec. 2022
◦ Yihao Foodstuff Scholarship	Nov. 2022
◦ National Scholarship (Top 0.2%)	Dec. 2021
◦ First Class Scholarship, CSU	Nov. 2021