Bairui Li

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Education

Peking University   *Sep. 2023 - Present*

- B.S. candidate in **Theoretical and Applied Mechanics** (Computational Science and Engineering track), College of Engineering, PKU ↗;
- B.S. candidate in **Computer Science**, School of Electronics Engineering and Computer Science, PKU ↗.
- **GPA: 3.67/4.00**; **CS Major GPA: 3.75/4.00** (equivalent to 89.5/100).
- **Related Courses** (some of which are in progress):
  - **Systems:** Computer Networks (Honor Track) (93), Introduction to Computer Systems (85), Computer Architecture.
  - **AI:** Introduction to Artificial Intelligence (96), Introduction to Computer Vision (89), Continuous-Time Diffusion Processes in Machine Learning Theory (94), Machine Learning, Multimodal Learning, Introduction to Visual Computing and Interaction, Reinforcement Learning (self-studied with Reinforcement Learning: An Introduction).
  - **Programming and Algorithms:** Practice of Programming in C & C++ (89), Data Structures and Algorithms (92.5), Programming in Artificial Intelligence.
  - **Mathematics:** Numerical Analysis (88), Ordinary Differential Equations (91), Engineering Mathematics (93), Advanced Algebra I (87), Probability and Statistics.

Standardized Tests

- **TOEFL iBT: 104** (Reading 29, Listening 26, Writing 25, Speaking 24)

Research Experience

Diffusion LLM with Flexible-Length Generation   *Aug. 2025 – Present*
Advisor: Prof. Yitao Liang ↗, Assistant Professor, Institute for Artificial Intelligence, Peking University

- Analyzed why *fixed-length* decoding in diffusion-based LLMs degrades generation quality; surveyed Diffusion-LM, Masked dLLM, DreamOn, and related architectures.
- Built and evaluated experimental pipelines to diagnose sources of low-quality decoding (e.g., non-canonical token encodings) and assessed the effects of various length-control strategies.
- Explored approaches for enabling **flexible-length generation**, drawing on insights from Block Diffusion, DreamOn, and other token-wise diffusion frameworks.
- Developed a strong understanding of discrete diffusion training, sampling, and token-level probabilistic modeling for diffusion LLMs.
- **A manuscript based on this work is in preparation and is planned for submission to ICML 2026.**

Projects

Mytorch: A CUDA-Accelerated Neural Network Framework   *Sep. 2025 - Dec. 2025*

- Trained a classifier on MNIST using PyTorch as a reference baseline.
- Implemented `Tensor`, fully connected/conv layers, softmax, and cross-entropy in CUDA.
- Implemented an autograd engine supporting diverse computation graphs; built an SGD optimizer atop it.
- Packaged CUDA/C++ components via `pybind11` for parallelized training and evaluation.

Skills

- **Programming:** Python (with PyTorch), C/C++ (with CUDA)
- **Tools:** GitHub/Gitee, Hugging Face, LaTeX, Markdown
- **Dev Environments:** PyCharm, VS Code

- **Languages:** Chinese (native), English (TOEFL 104)

Honors and Awards

- **CMC** — The Chinese Mathematics Competitions
    - <u>Provincial third prize</u> in major group-A other than mathematics
- **PKUCPC** — Peking University Collegiate Programming Contest
    - <u>Third prize</u> in PKUCPC 2025
- **IM^{2}C** — The International Mathematical Modeling Challenge
    - <u>Meritorious</u> in IMMC2019 China (Control Number: #19152089)

Leadership & Activities

Student Union, College of Engineering, Peking University — Member, Arts and Sports Department	*Sep. 2023 - Aug. 2024*
Student Union, College of Engineering, Peking University — Head, Arts and Sports Department	*Sep. 2024 - Aug. 2025*