Boyao Liao | Curriculum Vitae

bxl307@student.bham.ac.uk & (+86) 19807907696
xuan-lgbq.github.io @xuan10210860 Google Scholar

RESEARCH INTERESTS

Learning theory, deep learning theory, optimization theory.

EDUCATION

Jinan University – University of Birmingham Joint Institute **Guangzhou, China**
B.Sc. in Mathematics with Applied Mathematics *September 2023–Now*

– GPA: 4.11/4.25, rank: 3/68. *University of Birmingham criterion: above 75 is A+.*
– GPA: 4.18/5, rank: 3/68. *Jinan University criterion: 90–100 is A.*

AWARDS & HONORS

- **Best Student Paper Award**, The 37th International Conference on Algorithmic Learning Theory (ALT), 2026
- **National Scholarship**, Ministry of Education of the People's Republic of China, 2024
- **Outstanding Student**, Jinan University, 2024

SElECTED RESEARCH EXPERIENCE

Optimization Dynamics and Learning Theory for Deep Neural Networks *2025–Now*

- Study fine-grained optimization dynamics of stochastic gradient descent, with an emphasis on step-size conditions, loss landscapes, and architecture-dependent training behavior.
- Analyze Hessian spectral phenomena in deep neural networks, including how depth influences bifurcation-like spectral behavior during training.
- Work under the supervision of Prof. Yaoqing Yang at Dartmouth College.

Online Routing and Budgeted Multi-Armed Bandits *2025–Now*

- Study online shortest-path routing under hard anytime budget constraints in a combinatorial semi-bandit setting.
- Work under the supervision of Prof. Hongyi Jiang at City University of Hong Kong.

SELECTED PUBLICATIONS

- **Suspicious Alignment of SGD: A Fine-Grained Step Size Condition Analysis**
  Shenyang Deng, **Boyao Liao**, Zhuoli Ouyang, Tianyu Pang, Minhak Song, Yaoqing Yang
  The 37th International Conference on Algorithmic Learning Theory (ALT), 2026. **Best Student Paper Award**.
  arXiv: 2601.11789
- **Depth, Not Data: An Analysis of Hessian Spectral Bifurcation**
  Shenyang Deng, **Boyao Liao**, Zhuoli Ouyang, Tianyu Pang, Yaoqing Yang
  IEEE International Symposium on Information Theory (ISIT), 2026.
  arXiv: 2602.00545

SKILLS

Programming Python, PyTorch, MATLAB, C, Java, LaTeX
Mathematics Optimization, probability, statistics, linear algebra, real analysis
Languages Chinese, English

SELECTED COURSES

- Real Analysis, Analytical Geometry, Sequences and Series, Algebra and Combinatorics, Probability and Statistics, Introduction to Data Analysis, C Programming.

REFERENCES

- **Prof. Yaoqing Yang**
  Dartmouth College
  Research Advisor
- **Prof. Hongyi Jiang**
  City University of Hong Kong
  Research Advisor