Xingjian Bai

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Education

Ph.D. in Computer Science, Massachusetts Institute of Technology Sep 2024 – Present

- Advisor: Kaiming He
- Topics: generative models, AI for science.

Master of Mathematics and Computer Science, University of Oxford Oct 2023 – July 2024

Bachelor of Arts, University of Oxford Oct 2020 – July 2023
Mathematics and Computer Science

- Graduated with Distinction and the **Gibbs Prize**, for the best performance in CS exams.
- Final-year project won the **Departmental Prize for the best project**.

Research Experience

Visual Geometry Group (VGG), Oxford Oct 2023 - Apr 2024
Student Researcher *Supervisor: Prof. Christian Rupprecht, Luke Melas-Kyriazi*
Topics: Develop diffusion models parametrized by fixed-point dynamic systems, which enable dynamic allocation of computational resources across denoising timesteps.

Stanford Vision & Learning Lab (SVL) Jul 2023 - Sep 2023
Undergraduate Visiting Research Intern *Supervisor: Prof. Jiajun Wu*
Topics: Enhance the compositionality of diffusion models with neural-symbolic control; distill the understanding of abstract relations from Large Language Models.

Algorithms and Complexity Theory Group, Oxford Mar 2023 - Aug 2023
Student Researcher *Supervisor: Prof. Christian Coester*
Topics: Innovated sorting algorithms leveraging erroneous predictions from machine learning models; obtained optimal, sub-$O(n \log n)$ comparison complexity with good predictions.

Mathematics Institute, Oxford Jul 2022 - Apr 2023
Summer Research Intern *Supervisor: Prof. Jan Obłój*
Topics: Proposed adversarial attack algorithms grounded in distributional robust optimization (DRO) sensitivity analysis; advanced the understanding of robustness of neural networks.

AI Safety Research Lab, Oxford Nov 2022 - Mar 2023
Student Researcher *Mentor: Joar Skalse*
Topics: Explored reward hacking due to over-optimization in Reinforcement Learning settings; developed a geometric explanation and an early-stopping algorithm to prevent it in training.

Publications

Xingjian Bai, Christian Coester, Romain Cosson "Unweighted Layered Graph Traversal: Passing a Crown via Entropy Maximization." ***SODA*** *(to appear) 2025.*

Xingjian Bai, Luke Melas-Kyriazi "Fixed Point Diffusion Models." ***CVPR*** *2024.* [arXiv]

Xingjian Bai, Christian Coester "Sorting with Predictions." ***NeurIPS*** *2023.* [arXiv]

Xingjian Bai, Guangyi He, Yifan Jiang, Jan Obloj "Wasserstein Distributional Robustness of Neural Networks." ***NeurIPS*** *2023.* [arXiv]

Jacek Karwowski, Oliver Hayman, **Xingjian Bai**, Klaus Kiendlhofer, Charlie Griffin, Joar Skalse "Goodhart's Law in reinforcement learning." ***ICLR** 2024*. [arXiv] [Post]

Xingjian Bai, Ruining Ma, Yulong Lou "Containing Invasive Species via Cellular Automaton and AI." *Journal of Undergraduate Mathematics and Its Applications (**UMAP**)*, 2021.

Hannah Rose Kirk, Yennie Jun, Paulius Rauba, Gal Wachtel, Ruining Li, **Xingjian Bai**, Noah Broestl, Martin Doff-Sotta, Aleksandar Shtedritski, Yuki M. Asano "Memes in the Wild: Assessing the Generalizability of the Hateful Memes Challenge Dataset." *Proceedings of the 5th Workshop on Online Abuse and Harms (**WOAH**)*, 2021. [arXiv]

Awards & Honors

NeurIPS Scholar Award 2023
Conference on Neural Information Processing Systems (NeurIPS)

Regional Gold Medalist, going to ICPC World Final 2023
International Collegiate Programming Contest (ICPC)

Outstanding Winner & American Maths Society Best Paper (1 / 10053) 2021
37th Mathematical Contest in Modeling

"*Hack the Hackers' Hack*" award, best out of 66 teams 2020
Oxford Hackathon

Full Score 2019
USA Computing Olympiad Open

First place among the national team 2018
Canadian Computing Olympiad

Silver Medalist 2018
Chinese National Olympiad in Informatics

First place in Beijing, 395 / 400 points 2016
Chinese National Olympiad in Informatics Provincial - middle school division

Other Experience

Class & Practical Demonstrator, Computer Vision Present
Computer Science department, Oxford

Oxford Student Ambassador Present
Mathematics Institute & Computer Science department
Participate in outreach events and teach algorithms to students from underdeveloped region.

Conferences and workshops reviewer Present
NAACL Workshop, NeurIPS, ICLR

Practicals Demonstrator, Compilers 2022
Computer Science department, Oxford

Skills & Interests

Programming Languages: Proficient in C++, Python; experienced in Julia, Java, Scala, Haskell.
Hobbies: Marathon (4h 7min), tennis, table tennis, the game of Go (3 Dan).