XIYU ZHAI

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EDUCATION

Massachusetts Institute of Techology *August 2018 - Present*
PhD Candidate, EECS Department
Major: Programming Language for AI

University of Cambridge *October 2017 - June 2018*
Master of Advanced Studies in Part III Mathematics
Major: Pure Mathematics and Statistics
Grades: Distinction

University of Science and Technology of China *August 2013 - July 2017*
Bachelor of Science
Major: Pure Mathematics
Department of Mathematical Sciences
GPA: 4.11/4.3, Rank: #1

RESEARCH

- Programming Language for AI.

  I'm implementing an programming system (language+analyzer+debugger+visualizer) that enables advanced learning-augmented programming across multiple domains, including pattern recognition in computer vision, learning-based rendering, video compression, RL, theorem proving, etc.

  The immediate goal now is to make a very fast, fully interpretable, provably robust classifier for images (which must be different from deep learning in every possible way).

  Have started pursuing this goal even before PhD. It started as a theoretical project, but recently it has transformed into a programming language project.

  Expect to finish the first round of results before the start of my fifth year of PhD.

- Number Theory.

  I'm simultaneously interested in Number Theory itself and rewriting existing proofs into machine checkable ones, just like Xena project.

  Still learning the basics.

PROGRAMMING TECHNIQUE

- C++. Have experience writing and managing a codebase of 30k+ lines of code. But I know the language well enough to prefer Rust.
- Rust. My major language. I'm use Rust mostly in my PhD project, 16k lines of code currently.
- Javascript/Typescript. I use it for gui development. I had experience with React but now I'm using Svelte.
- Python. Have experience with it during internship and past immature attempts of my PhD project.
- Haskell. Didn't programmed much in it, but immitate many of its features in my project.

PUBLICATION

I've not yet finish anything publishable in my PhD project. So the following doesn't reflect much about what I'm doing right now.

1. Wenlong Mou, Liwei Wang, Xiyu Zhai, and Kai Zheng. Generalization bounds of sgld for non-convex learning: Two theoretical viewpoints. *COLT 2018*
2. Alexander Rakhlin and Xiyu Zhai. Consistency of interpolation with laplace kernels is a high-dimensional phenomenon. *COLT 2019*
3. Simon S. Du, Xiyu Zhai, Barnabás Póczos, and Aarti Singh. Gradient descent provably optimizes over-parameterized neural networks. *ICLR 2018*
4. Simon S. Du, Yining Wang, Xiyu Zhai, Sivaraman Balakrishnan, Ruslan R. Salakhutdinov, and Aarti Singh. How many samples are needed to learn a convolutional neural network? *NeurIPS 2018*
5. Simon S. Du, Jason D. Lee, Haochuan Li, Liwei Wang, and Xiyu Zhai. Gradient descent finds global minima of deep neural networks. *ICML 2019*
6. Tengyuan Liang, Alexander Rakhlin, and Xiyu Zhai. On the risk of minimum-norm interpolants and restricted lower isometry of kernels. *arXiv19*