

Zhi Wang

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University of Science and Technology of China, Hefei

Sept. 2021 - Expected Graduation: Jun. 2025

GPA: 88.7 / 100

Bachelor in Mathematics from the School of Gifted Young

Visiting student, University of California, Berkeley

Jan. 2023 - Dec. 2023

Research Interests

Learning theory, emergent behaviors, over-parameterized models, and feature learning. I'm also generally interested in optimization and computational neuroscience.

Research Experience and Publications

Ehrhart Theory of Special Order Polytopes, June 2023 to Sept 2024

- **Mentor:** *Andrés R. Vindas Meléndez, UC Berkeley*
- We obtained closed formulas for two extreme cases, a combinatorial formula for general cases, several monotonicity result, and conjectures based on computational evidence.

Grokking and Escape Kernel Regime Faster, April 2024 to ongoing

- **Mentor:** *Difan Zou, University of Hong Kong*
- We further explore the transition from NTK kernel to rich learning regimes, and use low-rank structures to accelerate grokking in both MLPs and transformers.

Non-normal connectivity and sequential activity generation, Sept 2024 to ongoing

- **Mentor:** *Quan Wen, University of Science and Technology of China*
 - We seek to obtain a principled understanding of how the brain generates sequential actions, we study how the non-normal connectivity of RNNs contributes to the generation mechanism. Experimentally, we analyze data from the organism *C. elegans*.
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Projects

- (UC Berkeley Math Department) Directed Reading Program on game theory from a rigorous pure math point of view, with a final presentation to the mentors.
 - Various projects either done for or started from classes:
 1. (C++, Python) Position based dynamics simulation and accompanying Manim expository video. *Video submission to Chinagraph 2024, Huangshan, Anhui.*
 2. (Java) Build Your Own World. I designed and implemented a 2D tile-based world exploration game from scratch, with a UI interface.
 3. (Matlab) Image compression and Loop lifting wavelets algorithm.
 4. (Python) Deep learning models for movie recommendation systems.
 5. (Review Paper) *On Ehrhart Polynomial of Birkhoff Polytopes.*
 6. (Python, Review Paper) *Numerical Methods for Differential Equations.*
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Skills

▲: familiar; ■: did a few projects; ●: quite experienced

- **Programming Languages:** Java ■, Python ●, C ▲, C++ ●, Lean ▲.
 - **Software and Tools:** Matlab ■, L^AT_EX●
 - **Languages:** Mandarin Chinese, English, French (B2), Spanish (A2).
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Volunteering and Seminars

- APEC 2023 volunteer, San Francisco; Berkeley AI Hackathon 2023 volunteer.
- AI for Mathematics: Formalization and Theorem Proving Seminar (Peking University BICMR, Jan 14th - 27th, 2024)