Zhi Wang

Contact me at wangzhi0467@outlook.com. See also my Personal page and GitHub.

University of Science and Technology of China, Hefei

Sept. 2021 - Expected Graduation: Jun. 2025 Bachelor in Mathematics from the School of Gifted Young

Visiting student, University of California, Berkeley

Jan. 2023 - Dec. 2023

GPA: 88.7 / 100

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.
- Outcome: Paper on Arxiv.

Grokking and Escape Kernel Regime Faster, April 2024 to ongoing

- Mentor: Difan Zou, University of Hong Kong
- We drew inspiration from neuroscience and used low-rank structures to accelerate grokking and enable richer learning.

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*.

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.

Skills

- ▲: familiar; ■: did a few projects; ●: quite experienced
 - Programming Languages: Java \square , Python \bigcirc , C \triangle , C++ \bigcirc , Lean \triangle .
 - Software and Tools: Matlab ■, LATEX●
 - Languages: Mandarin Chinese, English, French (B2), Spanish (A2).

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)