Chendong Song

Zhili College, Tsinghua University
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EDUCATION

Tsinghua University Sep. 2021 - Jun. 2025
Zhili College, B.S. in Mathematics and Applied Mathematics, First-Class Honours Degree of Zhili College

- **GPA:** 3.86/4.00

RESEARCH INTERESTS

AI for Mathematics, Automated Theorem Proving, Probability and Combinatorics

PUBLICATIONS

Chendong Song, Zihan Wang, Frederick Pu, Haiming Wang, Xiaohan Lin, Junqi Liu, Jia Li, Zhengying Liu : LeanGeo: Formalizing Competitional Geometry problems in Lean. (paper)

Haiming Wang, Mert Unsal, Xiaohan Lin, Mantas Baksys, Junqi Liu, Marco Dos Santos, · · · , **Chendong Song**, · · · , Zhengying Liu, Jia Li : Kimina-Prover Preview: Towards Large Formal Reasoning Models with Reinforcement Learning. (tech report)

HONORS AND SCHOLARSHIPS

First-Class Honours Degree of Zhili College, Tsinghua University Jun. 2025

- Awarded to top-performing graduates; only recipient in a class of 30 students.

National High School Mathematics Olympiad Oct. 2020

- First Prize, Zhejiang Province.

National Olympiad in Informatics in Provinces(NOIP) Dec. 2017

- First Prize, Zhejiang Province.

Tsinghua Xuetang Talent Program Scholarship, Tsinghua University Jun. 2022 - Jun. 2025

- Awarded to top-performing graduates based on academic excellence.

Comprehensive Excellence Scholarship, Tsinghua University Dec. 2024

- Awarded to top 20% students for overall excellence.

Academic Excellence Scholarship, Tsinghua University Jan. 2023 & Jan. 2024

- Top 10% of students in two consecutive years.

RESEARCH EXPERIENCE

Formalization of Geometric Problems and RL Training on Formal Mathematics Feb. 2025 - Jul. 2025
Internship, Moonshot AI, Advisor : Zhengying Liu, Jia Li

- Developed the first formal system for competition-level geometric reasoning, comprising a corpus of 260 theorems. Developed the first geometric reasoning benchmark and evaluate the performance of different LLMs. (paper)
- Used prompt engineering to generate prompt set and SFT data for training a reinforcement learning agent. Conduct reinforcement learning on geometry problems.

- Contributed to Kimina-Prover (tech report), SOTA of open-sourced theorem prover, by analyzing the result of RL experiment and preparing prompt sets and SFT data in multiple formats.

Automated Theorem Synthesis in Plane Geometry Sep. 2024 - Jun. 2025
Undergraduate Thesis, Advisor: Prof. Chenglong Bao, Tsinghua University

- Developed an automatic geometric construction system that generates precise diagrams using the formal language of AlphaGeometry.
- Explored strategies for autoformalizing natural language geometry problems, designed a three-step verification pipeline to ensure correctness, developed a dataset comprising 2,720 fully correct geometry problems.
- Deployed AlphaGeometry and conducted comprehensive testing on autoformalized dataset. (paper)

Matlab Simulation of Random Walks on Hexagonal Lattices Jul. 2024 - Sep. 2024
Computational Research Project, Advisor: Prof. Chenlin Gu, Yau Mathematical Sciences Center

- Conducted Matlab simulations for a paper on random walks on hexagonal lattices, reproduced the numerical results, and presented the project at the International Congress for Basic Science.

Monotone Inequalities on Ising and Potts Models Dec. 2023 - Aug. 2024
Research Assistant, Advisors: Prof. Chenlin Gu (Yau Mathematical Sciences Center), Prof. Wei Wu (NYU Shanghai)

- Studied various monotone inequalities in Ising models with external fields, such as FKG, GKS, and a recently discovered inequality: $\langle\sigma_o\rangle_{g+h} - \langle\sigma_o\rangle_{g-h} \leqslant \langle\sigma_o\rangle_h - \langle\sigma_o\rangle_{-h}$. Completed a survey on Ising and Potts models (link).
- Constructed counterexamples of monotone inequalities on binary trees, studied the uniqueness of AF-Potts model on binary tree, and explored optimal boundaries for AF-Potts models under $d+1 \geq \frac{e-1/2}{e-1}q$ and $1 > w \geq 1 - \frac{q}{d+1}\left(1 - \frac{K}{d+1}\right)$.

Formalization of Abstract Algebra on Lean4 Jul. 2024
Summer School, Peking University, Beijing

- Mastered the use of Lean4, a prevalent formal language.
- Independently transformed the natural language proof of 50 theorems in group theory to formalized proof, providing training data for AI4maths program. ·
- Learned about the cutting-edge products in AI4Math. AlphaGeometry, Numina and AlphaProof.

Markov Chains, Mixing Times and Cutoffs Jul. 2023 - Dec. 2023
Research Assistant, Advisor: Prof. Chenlin Gu, Yau Mathematical Sciences Center

- Constructed a family of Markov chains with two cutoffs using coupling methods.
- Tried to apply machine learning methods to construct graphs with multiple cutoffs.

LANGUAGES

- TOEFL: 99 (Reading: 28, Listening: 26, Writing: 25, Speaking: 21).
- French: DELF A2

EXTRACURRICULAR ACTIVITIES

Vice President, Science Association of Zhili College Sep. 2023 - Sep. 2024

- Organized 20 “Qingli Micro-Salon” events for face-to-face communication between mentors and students.