

Kaiyu Yang
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PROFESSIONAL APPOINTMENTS

Meta Fundamental AI Research (FAIR)
Research Scientist

New York, NY
6/2024 – Present

California Institute of Technology
Computing, Data, and Society Postdoctoral Fellow

Pasadena, CA
9/2022 – 5/2024

Advisors: Pietro Perona and Yisong Yue

EDUCATION

Princeton University
Ph.D. in Computer Science

Princeton, NJ
7/2022

Advisor: Jia Deng

University of Michigan
M.S. in Computer Science and Engineering

Ann Arbor, MI
8/2018

Tsinghua University
B.Eng. in Computer Science
B.S. in Mathematics and Applied Mathematics

Beijing, China
7/2016
7/2016

RESEARCH INTERESTS

AI · Machine Learning · LLMs for Theorem Proving and Mathematical Reasoning

PUBLICATIONS

* Equal contribution. † Equal advising

- Preprint **Goedel-Prover: A Frontier Model for Open-Source Automated Theorem Proving**
Yong Lin*, Shange Tang*, Bohan Lyu, Jiayun Wu, Hongzhou Lin, Kaiyu Yang, Jia Li, Mengzhou Xia, Danqi Chen, Sanjeev Arora, Chi Jin.
Technical report, 2025
- Preprint **PyEuclid: A Versatile Formal Plane Geometry System in Python**
Zhaoyu Li*, Hangrui Bi*, Jialiang Sun*, Zenan Li, Kaiyu Yang, Xujie Si.
In submission, 2025
- Preprint **Spectral Journey: How Transformers Predict the Shortest Path**
Andrew Cohen, Andrey Gromov, Kaiyu Yang, Yuandong Tian.
In submission, 2025

- Preprint **Formal Mathematical Reasoning: A New Frontier in AI**
Kaiyu Yang, Gabriel Poesia, Jingxuan He, Wenda Li, Kristin Lauter, Swarat Chaudhuri,
Dawn Song.
In submission, 2025
- Preprint **Towards Large Language Models as Copilots for Theorem Proving in Lean**
Peiyang Song, Kaiyu Yang, Anima Anandkumar.
In submission, 2025
- ICLR 2025 **Proving Olympiad Inequalities by Synergizing LLMs and Symbolic Reasoning**
Zenán Li*, Zhaoyu Li*, Wen Tang, Xian Zhang, Yuan Yao, Xujie Si, Fan Yang, Kaiyu Yang†,
Xiaoxing Ma†.
International Conference on Learning Representations, 2025
- NeurIPS 2024 **SciInstruct: A Self-Reflective Instruction Annotated Dataset
for Training Scientific Language Models**
Dan Zhang, Ziniu Hu, Sining Zhoubian, Zhengxiao Du, Kaiyu Yang, Zihan Wang, Yisong
Yue, Yuxiao Dong, Jie Tang.
Neural Information Processing Systems (NeurIPS), 2024
- COLM 2024 **A Survey on Deep Learning for Theorem Proving**
Zhaoyu Li, Jialiang Sun, Logan Murphy, Qidong Su, Zenan Li, Xian Zhang, Kaiyu Yang,
Xujie Si.
Conference on Language Modeling (COLM), 2024
- ICML 2024 **Autoformalizing Euclidean Geometry**
Logan Murphy*, Kaiyu Yang*, Jialiang Sun, Zhaoyu Li, Anima Anandkumar, Xujie Si.
International Conference on Machine Learning (ICML), 2024
- NeurIPS 2023 **LeanDojo: Theorem Proving with Retrieval-Augmented Language Models**
Kaiyu Yang, Aidan Swope, Alex Gu, Rahul Chalamala, Peiyang Song, Shixing Yu, Saad
Godil, Ryan Prenger, Anima Anandkumar.
Neural Information Processing Systems (NeurIPS), 2023, **Oral presentation**
- CVPR 2023 **Infinite Photorealistic Worlds using Procedural Generation**
Alexander Raistrick*, Lahav Lipson*, Zeyu Ma*, Lingjie Mei, Mingzhe Wang, Yiming Zuo,
Karhan Kayan, Hongyu Wen, Beining Han, Yihan Wang, Alejandro Newell, Hei Law, Ankit
Goyal, Kaiyu Yang, Jia Deng.
Conference on Computer Vision and Pattern Recognition (CVPR), 2023
- TMLR 2023 **Learning Symbolic Rules for Reasoning in Quasi-Natural Language**
Kaiyu Yang and Jia Deng.
Transactions on Machine Learning Research (TMLR), 2023
- EMNLP 2022 **Generating Natural Language Proofs with Verifier-Guided Search**
Kaiyu Yang, Jia Deng, Danqi Chen.
Empirical Methods in Natural Language Processing (EMNLP), 2022, **Oral presentation**
- ICML 2022 **A Study of Face Obfuscation in ImageNet**
Kaiyu Yang, Jacqueline Yau, Li Fei-Fei, Jia Deng, Olga Russakovsky.
International Conference on Machine Learning (ICML), 2022

NeurIPS 2020	Strongly Incremental Constituency Parsing with Graph Neural Networks <u>Kaiyu Yang</u> and Jia Deng. <i>Neural Information Processing Systems (NeurIPS)</i> , 2020
NeurIPS 2020	Rel3D: A Minimally Contrastive Benchmark for Grounding Spatial Relations in 3D Ankit Goyal, <u>Kaiyu Yang</u> , Dawei Yang, Jia Deng. <i>Neural Information Processing Systems (NeurIPS)</i> , 2020, Spotlight presentation
FAT* 2020	Towards Fairer Datasets: Filtering and Balancing the Distribution of the People Subtree in the ImageNet Hierarchy <u>Kaiyu Yang</u> , Klint Qinami, Li Fei-Fei, Jia Deng, Olga Russakovsky. <i>Conference on Fairness, Accountability, and Transparency (FAT*)</i> , 2020
ICML 2019	Learning to Prove Theorems via Interacting with Proof Assistants <u>Kaiyu Yang</u> and Jia Deng. <i>International Conference on Machine Learning (ICML)</i> , 2019
ICCV 2019	SpatialSense: An Adversarially Crowdsourced Benchmark for Spatial Relation Recognition <u>Kaiyu Yang</u> , Olga Russakovsky, Jia Deng. <i>International Conference on Computer Vision (ICCV)</i> , 2019
ECCV 2016	Stacked Hourglass Networks for Human Pose Estimation Alejandro Newell, <u>Kaiyu Yang</u> , Jia Deng. <i>European Conference on Computer Vision (ECCV)</i> , 2016

AWARDS AND GRANTS

Neurosymbolic AI for Autonomy	2023
<i>Co-authored proposal awarded by Caltech's Center for Autonomous Systems and Technologies</i>	
Siebel Scholar	2022
<i>42 computer science graduate students awarded annually from selected institutions worldwide</i>	
Outstanding Reviewer	2020, 2021
<i>Top 20% at the Conference on Computer Vision and Pattern Recognition (CVPR)</i>	
Google Cloud Research Credits	2019
<i>Google Cloud Platform</i>	
Outstanding Teaching Assistant Award	2015, 2016
<i>Tsinghua University</i>	

MEDIA

Mathematicians' Newest Assistants Are Artificially Intelligent	2024
<i>Scientific American</i>	
Can LLMs Generate Mathematical Proofs that can be Rigorously Checked?	2023
<i>MarkTechPost</i>	
Exploring the Tradeoff Between Privacy and Algorithm Performance	2022
<i>Princeton Insights</i>	
Researchers Devise Approach to Reduce Biases in Computer Vision Data Sets	2020
<i>Princeton Engineering News</i>	
AI Is Biased. Here's How Scientists Are Trying to Fix It	2019
<i>Wired</i>	

INVITED TALKS

Towards an AI Mathematician

Brown University	Host: Robert Lewis, 9/2024
University of California, Los Angeles	5/2024
University of Chicago	Host: Haifeng Xu, 4/2024
FAIR, Meta AI	Host: Kristin Lauter, 4/2024
University of Texas, Austin	Host: Swarat Chaudhuri, 3/2024

Towards Large Language Models as Copilots for Theorem Proving

Lean Together Annual Meeting	1/2024
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Theorem Proving via Machine Learning

Lean for the Curious Mathematician Colloquium	9/2023
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LeanDojo: Theorem Proving with Retrieval-Augmented Language Models

Neural Information Processing Systems (NeurIPS) Oral Presentation	12/2023
Stanford Software Research Lunch	10/2023
Conference on Artificial Intelligence and Theorem Proving (AITP)	9/2023
Hoskinson Center for Formal Mathematics, CMU	Host: Jeremy Avigad, 5/2023
Rutgers University	Host: Alex Kontorovich, 7/2023

Neurosymbolic Reasoning, From Formal Logic to Natural Language

University of California, Los Angeles	Host: Guy Van den Broeck, 2/2023
University of California, Santa Barbara	Host: Lei Li, 11/2022
University of Southern California	Host: Xiang Ren, 10/2022

Teaching Machines to Reason Symbolically

OpenAI	3/2022
Google	Host: Denny Zhou, 2/2022
University of Pennsylvania	Host: Mayur Naik, 2/2022
NSF “Understanding the World Through Code” Program	Host: Swarat Chaudhuri, 1/2022

Generating Natural Language Proofs with Verifier-Guided Search

N2Formal Group, Google	Host: Markus Rabe, 7/2022
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RESEARCH MENTORING

Zhaoyu Li <i>PhD student @ University of Toronto</i>	2025 – Present
Jiacheng Chen <i>Undergraduate @ South China University of Technology</i>	2024 – Present
Peiyang Song <i>Undergraduate @ UCSB → Undergraduate @ Caltech</i>	2023 – 2024
Rahul Chalamala <i>Undergraduate @ Caltech → Researcher @ Together AI</i>	2023
Shixing Yu <i>Master’s student @ UT Austin → Ph.D. student @ Cornell</i>	2022 – 2023
Gene Chou <i>Undergraduate @ Princeton → Ph.D. student @ Cornell</i>	2021
Jacqueline Yau <i>Master’s student @ Stanford → Ph.D. student @ UIUC</i>	2019 – 2020

TEACHING EXPERIENCE

Advanced Large Language Model Agents <i>Guest Co-instructor, UC Berkeley & MOOC</i>	Spring 2025
CS 159: Large Language Models for Reasoning <i>Guest Lecturer, Caltech</i>	2024/5
COS 484/584: Natural Language Processing <i>Teaching Assistant, Princeton University</i>	2021/2 – 2021/5
Data Structures and Algorithms <i>Head Teaching Assistant, Tsinghua University</i>	2013/8 – 2016/7

SERVICE

Organizer

The 3rd Workshop on Mathematical Reasoning and AI @ NeurIPS 2023
Tutorial on Machine Learning for Theorem Proving @ NeurIPS 2023

Area Chair

International Conference on Machine Learning (ICML), 2025
European Conference on Computer Vision (ECCV), 2024

Reviewer

National Academies Workshop Proceedings: “AI to Assist Mathematical Reasoning”
European Research Council (ERC) Advanced Grant 2023
International Conference on Machine Learning (ICML)
Neural Information Processing Systems (NeurIPS)
International Conference on Learning Representations (ICLR)
Journal of Machine Learning Research (JMLR)
IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
Computer Vision and Pattern Recognition (CVPR)
International Conference on Computer Vision (ICCV)
European Conference on Computer Vision (ECCV)