Kaiyu Yang

Research Scientist @ Meta FAIR

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PROFESSIONAL APPOINTMENTS

Meta Fundamental AI Research (FAIR)   New York, NY
Research Scientist   6/2024 – Present

California Institute of Technology   Pasadena, CA
Computing, Data, and Society Postdoctoral Fellow   9/2022 – 5/2024

> Advisors: Pietro Perona and Yisong Yue

EDUCATION

Princeton University   Princeton, NJ
Ph.D. in Computer Science   7/2022

> Advisor: Jia Deng

University of Michigan   Ann Arbor, MI
M.S. in Computer Science and Engineering   8/2018

Tsinghua University   Beijing, China
B.Eng. in Computer Science   7/2016
B.S. in Mathematics and Applied Mathematics   7/2016

RESEARCH INTERESTS

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

PUBLICATIONS

* Equal contribution. † Equal advising

Preprint   **Formal Mathematical Reasoning: A New Frontier in AI**

Kaiyu Yang, Gabriel Poesia, Jingxuan He, Wenda Li, Kristin Lauter, Swarat Chaudhuri, and Dawn Song.
In submission, 2025

Preprint   **Towards Large Language Models as Copilots for Theorem Proving in Lean**

Peiyang Song, Kaiyu Yang, and Anima Anandkumar.
In submission, 2025

ICLR 2025   **Proving Olympiad Inequalities by Synergizing LLMs and Symbolic Reasoning**

Zenan Li*, Zhaoyu Li*, Wen Tang, Xian Zhang, Yuan Yao, Xujie Si, Fan Yang, Kaiyu Yang†, and 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, and Xujie Si.
Conference on Language Modeling (COLM), 2024

ICML 2024 **Autoformalizing Euclidean Geometry**

Logan Murphy*, Kaiyu Yang*, Jialiang Sun, Zhaoyu Li, Anima Anandkumar, and 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, and 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, and 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, and 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, and Olga Russakovsky.
International Conference on Machine Learning (ICML), 2022

NeurIPS 2020 **Strongly Incremental Constituency Parsing with Graph Neural Networks**

Kaiyu Yang and Jia Deng.
Neural Information Processing Systems (NeurIPS), 2020

NeurIPS 2020 **Rel3D: A Minimally Contrastive Benchmark for Grounding Spatial Relations in 3D**

Ankit Goyal, Kaiyu Yang, Dawei Yang, and Jia Deng.
Neural Information Processing Systems (NeurIPS), 2020, **Spotlight presentation**

FAT* 2020 **Towards Fairer Datasets: Filtering and Balancing the Distribution of the People Subtree in the ImageNet Hierarchy**

Kaiyu Yang, Klint Qinami, Li Fei-Fei, Jia Deng, and Olga Russakovsky.
Conference on Fairness, Accountability, and Transparency (FAT)*, 2020

ICML 2019	**Learning to Prove Theorems via Interacting with Proof Assistants**
	<u>Kaiyu Yang</u> and Jia Deng.
	International Conference on Machine Learning (ICML), 2019

ICCV 2019	**SpatialSense: An Adversarially Crowdsourced Benchmark for Spatial Relation Recognition**
	<u>Kaiyu Yang</u>, Olga Russakovsky, and Jia Deng.
	International Conference on Computer Vision (ICCV), 2019

ECCV 2016	**Stacked Hourglass Networks for Human Pose Estimation**
	Alejandro Newell, <u>Kaiyu Yang</u>, and Jia Deng.
	European Conference on Computer Vision (ECCV), 2016

AWARDS AND GRANTS

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

MEDIA

An AI Tool that Allows LLMs to be used in Lean for Proof Automation   2024
    MarkTechPost
Can LLMs Generate Mathematical Proofs that can be Rigorously Checked?   2023
    MarkTechPost
Exploring the Tradeoff Between Privacy and Algorithm Performance   2022
    Princeton Insights
Researchers Devise Approach to Reduce Biases in Computer Vision Data Sets   2020
    Princeton Engineering News
AI Is Biased. Here's How Scientists Are Trying to Fix It   2019
    Wired

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

Theorem Proving via Machine Learning

Lean for the Curious Mathematician Colloquium	9/2023

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

RESEARCH MENTORING

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

TEACHING EXPERIENCE

CS294/194-280 Advanced Large Language Model Agents (In preparation)	Spring 2025
Co-instructor, UC Berkeley & MOOC	
CS 159: Large Language Models for Reasoning	2024/5
Guest Lecturer, Caltech	
COS 484/584: Natural Language Processing	2021/2 – 2021/5
Teaching Assistant, Princeton University	
Data Structures and Algorithms	2013/8 – 2016/7
Head Teaching Assistant, Tsinghua University	

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"

   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)

   ACM Transactions on Programming Languages and Systems (TOPLAS)

   Computer Vision and Pattern Recognition (CVPR)

   International Conference on Computer Vision (ICCV)

   European Conference on Computer Vision (ECCV)

   Nature Human Behaviour

   European Research Council (ERC) Advanced Grant 2023