

Kaiyu Yang

Research Scientist @ Meta, FAIR

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PROFESSIONAL APPOINTMENTS

Meta, Fundamental AI Research (FAIR)

Research Scientist

New York, NY

6/2023 – Present

California Institute of Technology

Computing, Data, and Society Postdoctoral Fellow

Pasadena, CA

9/2022 – 5/2023

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

- Preprint **SciGLM: Training Scientific Language Models with Self-Reflective Instruction Annotation and Tuning**
Dan Zhang, Ziniu Hu, Sining Zhoubian, Zhengxiao Du, [Kaiyu Yang](#), Zihan Wang, Yisong Yue, Yuxiao Dong, Jie Tang.
In submission, 2024
- Preprint **Towards Large Language Models as Copilots for Theorem Proving in Lean**
Peiyang Song, [Kaiyu Yang](#), and Anima Anandkumar.
In submission, 2024
- Preprint **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.
In submission, 2024

- ICML 2024 **Autoformalizing Euclidean Geometry**
 Logan Murphy*, Kaiyu Yang* (* equal contribution), 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**
Kaiyu Yang and Jia Deng.
International Conference on Machine Learning (ICML), 2019
- ICCV 2019 **SpatialSense: An Adversarially Crowdsourced Benchmark for Spatial Relation Recognition**
Kaiyu Yang, Olga Russakovsky, and Jia Deng.
International Conference on Computer Vision (ICCV), 2019
- ECCV 2016 **Stacked Hourglass Networks for Human Pose Estimation**
 Alejandro Newell, Kaiyu Yang, and Jia Deng.
European Conference on Computer Vision (ECCV), 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>	
ICML Travel Award	2019
<i>International Conference on Machine Learning (ICML)</i>	
SEAS Travel Grant	2019
<i>School of Engineering and Applied Science (SEAS), Princeton University</i>	
Outstanding Teaching Assistant Award	2015, 2016
<i>Tsinghua University</i>	

MEDIA

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

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

RESEARCH MENTORING

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

TEACHING EXPERIENCE

CS 159: Large Language Models for Reasoning	2024/5
<i>Guest Lecturer, Caltech</i>	
COS 484/584: Natural Language Processing	2021/2 – 2021/5
<i>Teaching Assistant, Princeton University</i>	
Data Structures and Algorithms	2013/8 – 2016/7
<i>Head Teaching Assistant, Tsinghua University</i>	

SERVICE

Organizer

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

Area Chair

- 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