

Kaiyu Yang

Postdoctoral Scholar @ Caltech

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ACADEMIC APPOINTMENTS

California Institute of Technology

Computing, Data, and Society Postdoctoral Fellow

Pasadena, CA

9/2022 – Present

Advisor: Anima Anandkumar

EDUCATION

Princeton University

Ph.D. in Computer Science

Princeton, NJ

7/2022

Advisor: Jia Deng

Dissertation: “Neurosymbolic Machine Learning for Reasoning”

Committee: Danqi Chen, Jia Deng, Mayur Naik, Karthik Narasimhan, Olga Russakovsky

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

[†] indicates equal advising

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|--------------|--|
| Preprint | SciGLM: Training Scientific Language Models with Self-Reflective Instruction Annotation and Tuning
Dan Zhang, Ziniu Hu, Sining Zhoubian, Zhengxiao Du, <u>Kaiyu Yang</u> , Zihan Wang, Yisong Yue, Yuxiao Dong, Jie Tang.
<i>In submission</i> , 2023 |
| Preprint | Towards Large Language Models as Copilots for Theorem Proving in Lean
Peiyang Song, <u>Kaiyu Yang</u> [†] , and Anima Anandkumar [†] .
<i>NeurIPS MATH-AI Workshop</i> , 2023 |
| NeurIPS 2023 | LeanDojo: Theorem Proving with Retrieval-Augmented Language Models
<u>Kaiyu Yang</u> , Aidan Swope, Alex Gu, Rahul Chalamala, Peiyang Song, Shixing Yu, Saad Godil, Ryan Prenger, and Anima Anandkumar.
<i>Neural Information Processing Systems (NeurIPS)</i> , 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, <u>Kaiyu Yang</u> , and Jia Deng. <i>Conference on Computer Vision and Pattern Recognition (CVPR)</i> , 2023
TMLR 2023	Learning Symbolic Rules for Reasoning in Quasi-Natural Language <u>Kaiyu Yang</u> and Jia Deng. <i>Transactions on Machine Learning Research (TMLR)</i> , 2023
EMNLP 2022	Generating Natural Language Proofs with Verifier-Guided Search <u>Kaiyu Yang</u> , Jia Deng, and Danqi Chen. <i>Empirical Methods in Natural Language Processing (EMNLP)</i> , 2022, Oral presentation
ICML 2022	A Study of Face Obfuscation in ImageNet <u>Kaiyu Yang</u> , Jacqueline Yau, Li Fei-Fei, Jia Deng, and Olga Russakovsky. <i>International Conference on Machine Learning (ICML)</i> , 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, and 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, and 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, and 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> , and 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>	
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>	

TALKS

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
Caltech	Host: Anima Anandkumar, 1/2022
Generating Natural Language Proofs with Verifier-Guided Search	
N2Formal Group, Google	Host: Markus Rabe, 7/2022
A Study of Face Obfuscation in ImageNet	
International Conference on Machine Learning (ICML)	7/2022

NeurIPS Workshop on “ImageNet: Past, Present, and Future”	12/2021
CVPR Workshop on “Learning from Limited and Imperfect Data (L2ID)”	6/2021
Learning Symbolic Rules for Reasoning in Quasi-Natural Language	
Princeton NLP Group	7/2021
Towards Fairer Datasets: Filtering and Balancing the Distribution of the People Subtree in the ImageNet Hierarchy	
Conference on Fairness, Accountability, and Transparency (FAT*)	1/2020
Learning to Prove Theorems via Interacting with Proof Assistants	
Princeton Programming Languages Group	10/2019
International Conference on Machine Learning (ICML)	6/2019

RESEARCH MENTORING

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

TEACHING EXPERIENCE

COS484/584: Natural Language Processing	2021/2 – 2021/5
<i>Teaching assistant, Department of Computer Science, Princeton University</i>	
Data Structures and Algorithms	2013/8 – 2016/7
<i>Head teaching assistant, Department of Computer Science and Technology, 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

- 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)
- Artificial Intelligence to Assist Mathematical Reasoning

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

Volunteer

Neural Information Processing Systems (NeurIPS)

Session Chair

Caltech SURF Seminar Day

Committee Member

Caltech CMS Graduate Admission Committee

REFERENCES

Anima Anandkumar

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Computing + Mathematical Sciences
California Institute of Technology
Pasadena, CA 91125
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Department of Computer Science
Princeton University
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