

Kaiyu Yang
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ACADEMIC APPOINTMENTS

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

Pasadena, CA
9/2022 – Present

Advisors: Pietro Perona & Yisong Yue

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

- 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
- Preprint **Autoformalizing Euclidean Geometry**
Logan Murphy, Jack Sun, Zhaoyu Li, Anima Anandkumar, Xujie Si[†], and [Kaiyu Yang](#)[†]
([†] equal advising).
In submission, 2024
- 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
- 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>	

TALKS

Towards an AI Mathematician

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
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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
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	2023 – 2024
<i>Undergraduate student @ UCSB</i>	
Rahul Chalamala	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

COS 484/584: 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

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

Volunteer

Neural Information Processing Systems (NeurIPS)

Session Chair

Caltech SURF Seminar Day

Committee Member

Caltech CMS Graduate Admission Committee