

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 · Neuro-symbolic Reasoning · Automated Theorem Proving

PUBLICATIONS

- 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**
- CVPR 2023 **Infinite Photorealistic Worlds using Procedural Generation**
A Raistrick, L Lipson, Z Ma, L Mei, M Wang, Y Zuo, K Kayan, H Wen, B Han, Y Wang, A Newell, H Law, A Goyal, K Yang, and J 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 <u>Kaiyu Yang</u> , Jia Deng, and Danqi Chen. <i>Conference on Empirical Methods in Natural Language Processing (EMNLP)</i> , 2022, Oral
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
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

Theorem Proving via Machine Learning

Lean for the Curious Mathematician	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
Caltech	Host: Anima Anandkumar, 1/2022

Generating Natural Language Proofs with Verifier-Guided Search

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

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

TEACHING EXPERIENCE

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

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

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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Jia Deng

Associate Professor
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