Kaiyu Yang

Postdoctoral Scholar @ Caltech
☎ 734-389-9696
✉ kaiyuy@caltech.edu
https://yangky11.github.io

ACADEMIC APPOINTMENTS

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

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

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
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
ICML Travel Award 2019
International Conference on Machine Learning (ICML)
SEAS Travel Grant 2019
School of Engineering and Applied Science (SEAS), Princeton University
Outstanding Teaching Assistant Award 2015, 2016
Tsinghua University

MEDIA

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

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

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

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
Undergraduate student @ South China University of Technology

Peiyang Song — 2023 – 2024
Undergraduate student @ UCSB

Rahul Chalamala — 2023
Undergraduate student @ Caltech

Shixing Yu — 2022 – 2023
Master's student @ UT Austin → Ph.D. student @ Cornell

Gene Chou — 2021
Undergraduate student @ Princeton → Ph.D. student @ Cornell

Jacqueline Yau — 2019 – 2020
Master's student @ Stanford → Machine Learning Engineer @ Apple

TEACHING EXPERIENCE

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

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