

TANG, HAO

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EDUCATION

| | |
|--|------------------------|
| Cornell University , Ithaca, NY, United States | <i>08/21 - Present</i> |
| Ph.D. in Computer Science | |
| Advisor: Kevin Ellis | |
| Shanghai Jiao Tong University , Shanghai, China | <i>09/17 - 03/21</i> |
| M.S. in Computer Science and Engineering (with honors) | |
| Advisor: Bao-Liang Lu | |
| Shanghai Jiao Tong University , Shanghai, China | <i>09/13 - 06/17</i> |
| B.S. in Computer Science and Engineering (with honors) | |

SELECTED TALKS

- Towards Sample Efficient Agents through Programmatic Inductive Biases
@ *Microsoft Research Lab – Montréal*, May 2024
@ *MIT Theory-RL Reading Group*, June 2024
@ *Mitsubishi Electric Research Laboratories Computer Vision Reading Group*, July 2024
@ *MIT Learning in Intelligent Systems (LIS) Group*, August 2024
- LLM for (Nonlinear) Loop Invariant Synthesis
@ *University of Toronto PLSE Group*, July 2024
- From perception to programs: regularize, overparameterize, and amortize
@ *PLDI Symposium on Machine Programming (PLDI-MAPS)*, June 2022
- Towards Scale-Invariant Graph-related Problem Solving by Iterative Homogeneous GNNs
@ *The 18th China Symposium on Machine Learning and Applications (MLA)*, November 2020

PREPRINTS

- Not All Thoughts Matter: Selective Attention for Efficient Reasoning**
Hao Tang, Guoqing Zheng, Kanishk Gandhi, Harkirat Behl, Vaishnavi Shrivastava, Mojan Javaheripi, Kevin Ellis, Shivam Garg, Dimitris Papailiopoulos

SELECTED PUBLICATIONS

- LLM-Guided Probabilistic Program Induction for POMDP Model Estimation**
Aidan Curtis, Hao Tang, Thiago Veloso, Kevin Ellis, Joshua Tenenbaum, Tomás Lozano-Pérez, Leslie Pack Kaelbling
Conference on Robot Learning (CoRL), 2025
- PoE-World: Compositional World Modeling with Products of Programmatic Experts**
Wasu Top Piriyakulkij, Yichao Liang, Hao Tang, Adrian Weller, Marta Kryven, Kevin Ellis
Annual Conference on Neural Information Processing Systems (NeurIPS), 2025
- Programmatic Video Prediction Using Large Language Models**
Hao Tang, Kevin Ellis, Suhas Lohit, Michael J Jones, Moitreyra Chatterjee
ICLR Workshop World Models, 2025

Learning Abstract World Models with Neuro-Symbolic Predicates for Robot Planning

Yichao Liang, Nishanth Kumar, Hao Tang, Adrian Weller, Joshua B Tenenbaum, Tom Silver, João F Henriques, Kevin Ellis

International Conference on Learning Representations (ICLR), 2025

Combining Induction and Transduction for Abstract Reasoning

Wen-Ding Li*, Keya Hu*, Carter Larsen, Yuqing Wu, Simon Alford, Caleb Woo, Spencer M. Dunn, Hao Tang, Michelangelo Naim, Dat Nguyen, Wei-Long Zheng, Zenna Tavares, Yewen Pu†, Kevin Ellis†
International Conference on Learning Representations (ICLR), 2025 & Best Paper at ARCPriize

WorldCoder, a Model-Based LLM Agent: Building World Models by Writing Code and Interacting with the Environment

Hao Tang, Darren Key, Kevin Ellis

Annual Conference on Neural Information Processing Systems (NeurIPS), 2024

Code Repair with LLMs gives an Exploration-Exploitation Tradeoff

Hao Tang, Keya Hu, Jin Peng Zhou, Sicheng Zhong, Wei-Long Zheng, Xujie Si, Kevin Ellis
Annual Conference on Neural Information Processing Systems (NeurIPS), 2024

From perception to programs: regularize, overparameterize, and amortize

Hao Tang, Kevin Ellis

International Conference on Machine Learning (ICML), 2023

Towards Scale-Invariant Graph-related Problem Solving by Iterative Homogeneous GNNs

Hao Tang, Zhiao Huang, Jiayuan Gu, Bao-Liang Lu, Hao Su

Annual Conference on Neural Information Processing Systems (NeurIPS), 2020

Refactoring Policy for Compositional Generalizability using Self-Supervised Object Proposals

Tongzhou Mu*, Jiayuan Gu*, Zhiwei Jia, Hao Tang, Hao Su

Annual Conference on Neural Information Processing Systems (NeurIPS), 2020

Belief Propagation Neural Networks

Jonathan Kuck, Shuvam Chakraborty, Hao Tang, Rachel Luo, J. Song, A. Sabharwal, Stefano Ermon

Annual Conference on Neural Information Processing Systems (NeurIPS), 2020

Emotion Recognition using Multimodal Residual LSTM Network

Jixin Ma*, Hao Tang*, Wei-Long Zheng, Bao-Liang Lu

ACM International Conference on Multimedia (ACM Multimedia), 2019

Multimodal emotion recognition using deep neural networks

Hao Tang, Wei Liu, Wei-Long Zheng, Bao-Liang Lu

International Conference on Neural Information Processing (ICONIP), 2017

EMPLOYMENT

Research Intern

Microsoft Research, WA, United States

05/25 - Present

- Efficient LLM-based reasoning by selective forgetting and summarization.

Research Intern

Mitsubishi Electric Research Laboratories, MA, United States

05/24 - 08/24

- Program synthesis for interpretable video understanding and prediction.

Graduate Researcher

Computer Science Department, Cornell University, NY, United States

08/21 - Present

- Neuro-Symbolic Program Synthesis, Model-based LLM Agents.

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| Remote Research Assistant | <i>03/20 - 12/20</i> |
| Stanford University, CA, United States | |
| • Learning to learn, Learn better belief propagation with GNNs. | |
| Visiting Graduate | <i>07/19 - 03/20</i> |
| University of California, San Diego, CA, United States | |
| • Generalizable GNNs w.r.t. graph scales by encoding iterative programmatic structure. | |
| Research Intern | <i>12/18 - 05/19</i> |
| OMRON SINIC X Corporation, Tokyo, Japan | |
| • Differentiable structured attentions, Structured sparsity, Graph representation learning. | |
| Research Assistant | <i>06/16 - 03/21</i> |
| Shanghai Jiao Tong University, Shanghai, China | |
| • State-of-the-arts on EEG-based multimodel emotion recognition. | |
| Research Intern | <i>07/15 - 09/15</i> |
| Information Technology R&D Center of Mitsubishi Electric, Fujisawa, Japan | |
| • Developed a Chinese intention understanding module for the dialog system in rice cookers. | |

OPEN SOURCE CONTRIBUTIONS

- Pytorch:** contributor, 4 commits
- Tensorflow:** contributor, 1 commit
- Pytorch-Geometric** (Pytorch-Scatter backend): contributor, 2 commits
- gfl** (graph-fused lasso solver): contributor, 4 commits
- parallel-cut-pursuit** (minimizes functionals structured over a weighted graph): contributor, 1 commit

HONORS AND AWARDS

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- Top Reviewer of NeurIPS
 - Outstanding Graduate of Shanghai Jiao Tong University (1%)