Jiayuan Mao

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Publication

Learning Iterative Reasoning through Energy Diffusion **ICML 2024**
Yilun Du*, Jiayuan Mao*, Joshua B. Tenenbaum

Finding Structure in Logographic Writing with Library Learning **CogSci 2024**
Guangyuan Jiang, Matthias Hofer, Jiayuan Mao, Lionel Wong, **(Best Undergraduate Student Paper)**
Joshua B. Tenenbaum, Roger P. Levy

"Set It Up !" : Functional Object Arrangement with Compositional Generative Models **RSS 2024**
Yiqing Xu, Jiayuan Mao, Yilun Du, Tomas Lozáno-Pérez, Leslie Pack Kaebling, David Hsu

Grounding Language Plans in Demonstrations through Counter-Factual Perturbations **ICLR 2024 (Spotlight)**
Yanwei Wang, Tsun-Hsuan Wang, Jiayuan Mao, Michael Hagenow, Julie Shah

Learning to Act from Actionless Videos through Dense Correspondences **ICLR 2024 (Spotlight)**
Po-Chen Ko, Jiayuan Mao, Yilun Du, Shao-Hua Sun, Joshua B. Tenenbaum

Learning Adaptive Planning Representations with Natural Language Guidance **ICLR 2024**
Lionel Wong*, Jiayuan Mao*, Pratyusha Sharma*, Zachary S. Siegel, Jiahai Feng, Noa Korneev, Joshua B. Tenenbaum, Jacob Andreas

Learning Planning Abstractions from Language **ICLR 2024**
Weiyu Liu, Geng Chen, Joy Hsu, Jiajun Wu*, Jiayuan Mao*

What Planning Problem Can A Relational Neural Network Solve **NeurIPS 2023 (Spotlight)**
Jiayuan Mao, Tomás Lozano-Pérez, Joshua B. Tenenbaum, Leslie Pack Kaelbling

What's Left ? Concept Grounding with Logic-Enhanced Foundation Models **NeurIPS 2023**
Joy Hsu*, Jiayuan Mao*, Joshua B. Tenenbaum, Jiajun Wu

Learning Reusable Manipulation Strategies **CoRL 2023**
Jiayuan Mao, Tomás Lozano-Pérez, Joshua B. Tenenbaum, Leslie Pack Kaelbling

Compositional Diffusion-Based Continuous Constraint Solvers **CoRL 2023**
Zhutian Yang, Jiayuan Mao, Yilun Du, Jiajun Wu, Joshua B. Tenenbaum, Tomás Lozano-Pérez, Leslie Pack Kaelbling

Composable Part-Based Manipulation **CoRL 2023**
Weiyu Liu, Jiayuan Mao, Joy Hsu, Tucker Hermans, Animesh Garg, Jiajun Wu

NS3D : Neuro-Symbolic Grounding of 3D Objects and Relations **CVPR 2023**
Joy Hsu, Jiayuan Mao, Jiajun Wu

Programmatically Grounded, Compositionally Generalizable Robotic Manipulation **ICLR 2023**
Renhao Wang*, Jiayuan Mao*, Joy Hsu, Hang Zhao, Jiajun Wu, Yang Gao **(Spotlight)**

Learning Rational Subgoals from Demonstrations and Instructions **AAAI 2023**
Zhezheng Luo*, Jiayuan Mao*, Jiajun Wu, Tomás Lozano-Pérez, Joshua B. Tenenbaum, Leslie Pack Kaelbling

DisCo : Improving Compositional Generalization in Visual Reasoning through Distribution Coverage **TMLR 2023**
Joy Hsu, Jiayuan Mao, Jiajun Wu

On the Expressiveness and Generalization of Hypergraph Neural Networks **LoG 2022**
Zhezheng Luo, Jiayuan Mao, Joshua B. Tenenbaum, Leslie Pack Kaelbling

Sparse and Local Hypergraph Reasoning Networks **LoG 2022**
Guangxuan Xiao, Leslie Pack Kaelbling, Jiajun Wu, Jiayuan Mao

PDSketch : Integrated Domain Programming, Learning, and Planning **NeurIPS 2022**
Jiayuan Mao, Tomás Lozano-Pérez, Joshua B. Tenenbaum, Leslie Pack Kaelbling

HandMeThat : Human-Robot Communication in Physical and Social Environments **NeurIPS 2022**
Yanming Wan*, Jiayuan Mao*, Joshua B. Tenenbaum

CLEVRER-Humans : Describing Physical and Causal Events the Human Way **NeurIPS 2022**
Jiayuan Mao*, Xuelin Yang*, Xikun Zhang, Noah D. Goodman, Jiajun Wu

IKEA-Manual : Seeing Shape Assembly Step by Step **NeurIPS 2022**
Ruocheng Wang, Yunzhi Zhang, Jiayuan Mao, Ran Zhang, Chin-Yi Cheng, Jiajun Wu

Translating a Visual LEGO Manual to a Machine-Executable Plan **ECCV 2022**
Ruocheng Wang, Yunzhi Zhang, Jiayuan Mao, Chin-Yi Cheng, Jiajun Wu

Programmatic Concept Learning for Human Motion Description and Synthesis **CVPR2022**
Sumith Kulal*, Jiayuan Mao*, Alex Aiken†, Jiajun Wu†

FALCON : Fast Visual Concept Learning by Integrating Images, Linguistic descriptions, and Conceptual Relations **ICLR 2022**
Lingjie Mei*, Jiayuan Mao*, Ziqi Wang, Chuang Gan, Joshua B. Tenenbaum

Grammar-Based Grounded Lexicon Learning **NeurIPS 2021**
Jiayuan Mao, Haoyue Shi, Jiajun Wu, Roger P. Levy, Joshua B. Tenenbaum

Temporal and Object Quantification Networks **IJCAI 2021**
Jiayuan Mao*, Zhezheng Luo*, Chuang Gan, Joshua B. Tenenbaum, Jiajun Wu, Leslie Pack Kaelbling, Tomer D. Ullman

Language-Mediated, Object-Centric Representation Learning **ACL 2021 (Findings)**
Ruocheng Wang*, Jiayuan Mao*, Samuel J. Gershman, Jiajun Wu

Hierarchical Motion Understanding via Motion Programs **CVPR 2021**
Sumith Kulal*, Jiayuan Mao*, Alex Aiken, Jiajun Wu

Grounding Physical Concepts of Objects and Events Through Dynamic Visual Reasoning **ICLR 2021**
Zhenfang Chen, Jiayuan Mao, Jiajun Wu, Kwan-Yee K. Wong, Joshua B. Tenenbaum, Chuang Gan

Object-Centric Diagnosis of Visual Reasoning **ArXiv 2020**
Jianwei Yang, Jiayuan Mao, Jiajun Wu, Devi Parikh, David D. Cox, Joshua B. Tenenbaum, Chuang Gan

Multi-Plane Program Induction with 3D Box Priors **NeurIPS 2020**
Yikai Li*, Jiayuan Mao*, Xiuming Zhang, William T. Freeman, Joshua B. Tenenbaum, Noah Snavely, Jiajun Wu

Perspective Plane Program Induction from a Single Image **CVPR 2020**
Yikai Li*, Jiayuan Mao*, Xiuming Zhang, William T. Freeman, Joshua B. Tenenbaum, Jiajun Wu

Program-Guided Image Manipulators **ICCV 2019**
Jiayuan Mao*, Xiuming Zhang*, Yikai Li, William T. Freeman, Joshua B. Tenenbaum, Jiajun Wu

Visual Concept-Metaconcept Learning **NeurIPS 2020**
Chi Han*, Jiayuan Mao* , Chuang Gan, Joshua B. Tenenbaum, Jiajun Wu

Visually Grounded Neural Syntax Acquisition **ACL 2020 (Best Paper Nominee)**
Haoyue Shi*, Jiayuan Mao*, Kevin Gimpel, Karen Livescu

Neurally-Guided Structure Inference **ICML 2019**
Sidi Lu*, Jiayuan Mao*, Joshua B. Tenenbaum, Jiajun Wu

The Neuro-Symbolic Concept Learner : Interpreting Scenes, Words, and Sentences From Natural Supervision **ICLR 2019 (Oral)**
Jiayuan Mao, Chuang Gan, Pushmeet Kohli, Joshua B. Tenenbaum, Jiajun Wu

Neural Logic Machines **ICLR 2019**
Honghua Dong*, Jiayuan Mao*, Tian Lin, Chong Wang, Lihong Li, Denny Zhou

Unified Visual-Semantic Embeddings : Bridging Vision and Language with Structured Meaning Representations **CVPR 2019 (Oral)**
Hao Wu*, Jiayuan Mao*, Yufeng Zhang, Yuning Jiang, Lei Li, Wei-Ying Ma

Neural Phrase-to-Phrase Machine Translation **ArXiv Preprint**
Jiangtao Feng, Lingpeng Kong, Po-Sen Huang, Chong Wang, Da Huang, Jiayuan Mao, Kan Qiao, Dengyong Zhou

Acquisition of Localization Confidence for Accurate Object Detection **ECCV 2018 (Oral)**
Borui Jiang*, Ruixuan Luo*, Jiayuan Mao*, Tete Xiao, Yuning Jiang

Learning Visually-Grounded Sementics from Contrastive Adversarial Samples **COLING 2018**
Haoyue Shi*, Jiayuan Mao*, Tete Xiao*, Yuning Jiang, Jian Sun

Universal Agent for Disentangling Environments and Tasks **ICLR 2018**
Jiayuan Mao, Honghua Dong, Joseph J. Lim

What Can Help Pedestrian Detection ? **CVPR 2017**
Jiayuan Mao*, Tete Xiao*, Yuning Jiang, Zhimin Cao

Education and Research Experience

2019-Present | **Massachusetts Institute of Technology**
Ph.D. Student in Computer Science

- Advisors : Joshua B. Tenenbaum and Leslie P. Kaelbling.
- Member of the Computational Cognitive Science (COCOSCI) lab.
- Member of the Learning and Intelligent Systems (LIS) lab.

2014-2019 | **Tsinghua University**
B.E. in Computer Science

- Special Pilot Computer Science Class (Yao Class)
- Institute for Interdisciplinary Information Sciences
- Member of Natural Language Processing laboratory : Learning Sememe-based Dependency Structures. (Undergrad Thesis)

2018-2019 | **COCOSCI Group, Massachusetts Institute of Technology**
Visiting Student, Advisor : Joshua B. Tenenbaum

- Neural-symbolic concept learning : interpreting scenes, words, and sentences from natural supervision. (ICLR 2019)
- Learning to describe natural images with programs. (ICCV 2019)

2018 | **Google AI China Center**
Research Intern, Mentor : Denny Zhou, Chong Wang

- Learning First-Order Logic rules using neural networks.
- Neural phrase-to-phrase machine translation.

2017 | **CLVR Lab, University of Southern California**
Visiting Student, Advisor : Joseph J. Lim

- Transfer learning for deep reinforcement learning. (ICLR 2018)

Academic Service

Organizer : Visually Grounded Interaction and Language (VIGIL) workshop at NAACL 2021, Neuro-Symbolic Visual Reasoning and Program Synthesis tutorial at CVPR 2020.

Reviewer : ICLR 2024, NeurIPS 2023, ICML 2023, ICLR 2023, CVPR 2023, ICML 2022, ICLR 2022, CVPR 2022, ECCV 2022, NeurIPS 2021, ICML 2021, ICLR 2021, CVPR 2021, NeurIPS 2020, CVPR 2020, CVPR 2019.

Teaching

Teaching Assistant : Representation, Inference and Reasoning in AI (Graduate), 2021 Fall, MIT
Teaching Assistant : Object-Oriented Programming, 2017 Spring, Tsinghua University.

Open-sourced Projects

Synchronized-BatchNorm-PyTorch : https ://github.com/vacancy/Synchronized-BatchNorm-PyTorch Synchronized Batch Normalization implementation in PyTorch. 1314 Stars on GitHub.

PreciseRoIPooling-PyTorch : https ://github.com/vacancy/PreciseRoIPooling Precise RoI Pooling with coordinate gradient support, proposed in my paper "Acquisition of Localization Confidence for Accurate Object Detection". 720 Stars on GitHub.

SceneGraphParser https ://github.com/vacancy/SceneGraphParser A python toolkit for parsing captions (in natural language) into scene graphs (as symbolic representations). 236 Stars on GitHub.