Meng Song

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RESEARCH INTERESTS

Reinforcement Learning, Self-supervised Learning

EDUCATION

University of California, San Diego   2016 - 2024
Ph.D. in Computer Science

Carnegie Mellon University   2013 - 2014
M.S. in Robotics

Nankai University   2009 - 2012
M.S. in Pattern Recognition and Intelligent Systems

Nankai University   2005 - 2009
B.S. in Software Engineering

WORK EXPERIENCE

Handshake AI Solutions, MOVE Fellow   April 2025 – Present
• Contributing to a confidential research project focused on advancing the capabilities of cutting-edge LLMs in machine learning domains.

Snap, Research Scientist Intern   Summer 2017
• Designed and developed a novel contrastive learning–based algorithm for logo detection in the wild, trained on a large-scale dataset of over 130K annotated images. This approach achieved 41% and 59% improvements in zero-shot and one-shot recall over standard classification methods.

SELECTED PROJECTS

University of California, San Diego, Graduate Student Researcher   2023-2024
• Designed and developed a novel probabilistic world model using contrastive learning. The learned latent space enables structure-aware exploration and task decomposition, and supports highly efficient planning without requiring any inference-time search.

University of California, San Diego, Graduate Student Researcher   2023
• Designed and developed a novel zero-shot prompting method that achieves up to 25% better generalization than few-shot approaches across diverse robotic control, manipulation, and navigation tasks. The proposed method eliminates the need for demonstrations in new tasks and enables interpretable generalization.

University of California, San Diego, Graduate Student Researcher   2022
• Contributed to the design of reward functions to guide discrete prompt generation for LLMs. The proposed RL-based prompt optimization approach outperforms a wide range of finetuning and prompting baselines on text classification and style transfer tasks.

University of California, San Diego, Graduate Student Researcher   2021-2022
• Designed and developed recurrent PPO and imitation learning agents for the Habitat visual navigation task to investigate how reinforcement learning and imitation learning algorithms generalize across environments, with support for parallel rollout collection and synchronous multi-environment training.

University of California, San Diego, Graduate Student Researcher   2020-2021
- Designed and developed a PPO agent that comes to understand physical concepts by mastering everyday skills.
- Designed and developed an embodied simulation environment with customizable materials and physical properties, along with a suite of tasks evaluating the agent's physical understanding capabilities.

SELECTED PUBLICATIONS

- **Meng Song**, "Towards Unsupervised Goal Discovery: Learning Plannable Representations with Probabilistic World Modeling", PhD Thesis, 2024 [PDF]

- **Meng Song**, "Probabilistic World Modeling with Asymmetric Distance Measure", *in Geometry-grounded Representation Learning and Generative Modeling Workshop at International Conference on Machine Learning* (ICML) [**Oral**], 2024 [PDF]

- **Meng Song**, Xuezhi Wang, Tanay Biradar, Yao Qin, Manmohan Chandraker, "A Minimalist Prompt for Zero-Shot Policy Learning", *in Task Specification Workshop at The Robotics: Science and Systems* (RSS), 2024 [PDF]

- Mingkai Deng, Jianyu Wang, Cheng-Ping Hsieh, Yihan Wang, Han Guo, Tianmin Shu, **Meng Song**, Eric P. Xing, Zhiting Hu, "RLPrompt: Optimizing Discrete Text Prompts with Reinforcement Learning", in *Conference on Empirical Methods in Natural Language Processing* (EMNLP), 2022 [PDF]

- **Meng Song**, Yuhan Liu, Zhengqin Li, Manmohan Chandraker, "Learning to Rearrange with Physics-Inspired Risk Awareness", in *Risk Aware Decision Making Workshop at The Robotics: Science and Systems* (RSS), 2022 [PDF]

- Zhengqin Li, Ting-Wei Yu, Shen Sang, Sarah Wang, **Meng Song**, Yuhan Liu, et al., "OpenRooms: An End-to-End Open Framework for Photorealistic Indoor Scene Datasets", in *Conference on Computer Vision and Pattern Recognition* (CVPR) [**Oral**], 2021 [PDF]

- Yuzhe Qin, Rui Chen, Hao Zhu, **Meng Song**, Jing Xu, Hao Su, "S^4G: Amodal Single-view Single-Shot $\mathbb{SE}(3)$ Grasp Detection in Cluttered Scenes", in *Conference on Robot Learning* (CoRL) [**Spotlight**], 2019 [PDF]

- **Meng Song**, Daniel Huber, "Automatic Recovery of Networks of Thin Structures", in *International Conference on 3D Vision* (3DV) [**Oral**], 2015 [PDF]

- **Meng Song**, Fengchi Sun, and Karl Iagnemma, "Natural landmark extraction in cluttered forested environments", in *IEEE International Conference on Robotics and Automation* (ICRA) [**Oral**], 2012 [PDF]

- **Meng Song**, Fengchi Sun, and Karl Iagnemma, "Natural feature based localization in forested environments", in *IEEE/RSJ International Conference on Intelligent Robots and Systems* (IROS) [**Oral**], 2012 [PDF]

PREPRINTS

- **Meng Song**, "Good Actions Succeed, Bad Actions Generalize: A Case Study on Why RL Generalizes Better", 2025 [PDF]

SKILLS

Programming Language: Python, C++, Matlab, Java, HTML, SQL
Machine Learning: Pytorch, Tensorflow, Numpy, Matplotlib, Wandb, Scikit-learn, Pandas
Reinforcement Learning: RLkit, RLlib, Garage, Stable-Baselines3, Tianshou, Gym, MuJoCo, PyBullet