Zhan Ling

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EDUCATION

University of California San Diego, La Jolla, California, USA 2019.9–Now
Doctor of Philosophy, Computer Science and Engineering, Advisor: Prof. Hao Su
Master of Science, Computer Science and Engineering

Tsinghua University, Beijing, China 2015.8–2019.7
Bachelor of Engineering, Institute for Interdisciplinary Information Sciences (IIIS)
Yao Class (founded by Turing Award Laureate, Prof. Andrew Chi-Chih Yao)

RESEARCH INTEREST

My long-term research interests lie in developing intelligent agents that can solve challenging problems and continually improve through interactions. I have extensively explored diverse areas such as imitation learning, reinforcement learning, robotics, and reasoning. Currently, my primary goal is to create an LLM/VLM-based reasoning agent capable of achieving superhuman performance on challenging problems, such as solving advanced math and coding problems.

PUBLICATIONS AND PREPRINTS

(*, **, **, indicates equal contribution)

1. Unleashing the Creative Mind: Language Model As Hierarchical Policy For Improved Exploration on Challenging Problem Solving. **Zhan Ling**, Yunhao Fang, Xuanlin Li, Tongzhou Mu, Mingu Lee, Reza Pourreza, Roland Memisevic, Hao Su. Preprint.
2. Deductive Verification of Chain-of-Thought Reasoning. **Zhan Ling***, Yunhao Fang*, Xuanlin Li, Zhiao Huang, Mingu Lee, Roland Memisevic, Hao Su. *Neural Information Processing Systems (NeurIPS) 2023.*
3. On the Efficacy of 3D Point Cloud Reinforcement Learning. **Zhan Ling***, Yunchao Yao*, Xuanling Li, Hao Su. Preprint.
4. Distilling Large Vision-Language Model with Out-of-Distribution Generalizability. Xuanlin Li*, Yunhao Fang*, Minghua Liu, **Zhan Ling**, Zhuowen Tu, Hao Su. *IEEE / CVF International Conference on Computer Vision (ICCV) 2023.*
5. Reparameterized Policy Learning for Multimodal Trajectory Optimization. Zhiao Huang, Litian Liang, **Zhan Ling**, Xuanlin Li, Chuang Gan, Hao Su. Deep Reinforcement Learning Workshop, Neural Information Processing Systems(NeurIPS) 2022; *International Conference on Machine Learning (ICML) 2023, **Oral**.*
6. PartSLIP: Low-Shot Part Segmentation for 3D Point Clouds via Pretrained Image-Language Models. Minghua Liu, Yinhao Zhu, Hong Cai, Shizhong Han, **Zhan Ling**, Fatih Porikli, Hao Su. *IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR) 2023.*

7. ManiSkill2: A Unified Benchmark for Generalizable Manipulation Skills. Jiayuan Gu*, Fanbo Xiang*, Xuanlin Li**, **Zhan Ling****, Xiqiang Liu**, Tongzhou Mu**, Yihe Tang**, Stone Tao**, Xinyue Wei**, Yunchao Yao**, Xiaodi Yuan, Pengwei Xie, Zhiao Huang, Rui Chen, Hao Su. *International Conference on Learning Representations (ICLR) 2023.*
8. Frame Mining: a Free Lunch for Learning Robotic Manipulation from 3D Point Clouds. Minghua Liu*, Xuanlin Li*, **Zhan Ling***, Yangyan Li, Hao Su. *Conference on Robot Learning (CoRL) 2022.*
9. Improving policy optimization with generalist-specialist learning. Zhiwei Jia, Xuanlin Li, **Zhan Ling**, Shuang Liu, Yiran Wu, Hao Su. *International Conference on Machine Learning (ICML) 2022.*
10. Close the Visual Domain Gap by Physics-Grounded Active Stereovision Depth Sensor Simulation. Xiaoshuai Zhang*, Rui Chen*, Ang Li**, Fanbo Xiang**, Yuzhe Qin**, Jiayuan Gu**, **Zhan Ling****, Minghua Liu**, Peiyu Zeng**, Songfang Han***, Zhiao Huang***, Tongzhou Mu***, Jing Xu, Hao Su. *IEEE Transactions on Robotics (T-RO) 2023.*
11. Approximate Convex Decomposition for 3D Meshes with Collision-Aware Concavity and Tree Search. Xinyue Wei*, Minghua Liu*, **Zhan Ling**, Hao Su. *ACM Transactions on Graphics (Proceedings of SIGGRAPH) 2022.*
12. ManiSkill: Generalizable Manipulation Skill Benchmark with Large-Scale Demonstrations. Tongzhou Mu*, **Zhan Ling***, Fanbo Xiang*, Derek Yang*, Xuanlin Li*, Stone Tao, Zhiao Huang, Zhiwei Jia, Hao Su. *Neural Information Processing Systems (NeurIPS) Datasets and Benchmarks Track 2021.*
13. State Alignment-based Imitation Learning. Fangchen Liu, **Zhan Ling**, Tongzhou Mu, Hao Su. *International Conference on Learning Representations (ICLR) 2020.*

AWARDS AND SERVICES

Conference Reviewer: CVPR 2022-2024; ICCV 2021, 2023; ECCV 2022, 2024; NeurIPS 2023-2024; ICLR 2024-2025; ICML 2024; ACCV 2024.
Journal Reviewer: T-RO; RA-L.
Program Committee: AAAI 2025.
Awards:

Outstanding Freshman Scholarship, Tsinghua University, 2015

First Prize (Gold Medal) in National Olympiad in Informatics (NOI), China, 2014

Workshop Reviewer:

Generalizable Policy Learning in the Physical World, ICLR 2022.

Interdisciplinary Exploration of Generalizable Manipulation Policy Learning: Paradigms and Debates, RSS 2023.

Challenge Organizer or Contributor:

SAPIEN ManiSkill Challenge 2021

SAPIEN ManiSkill Challenge 2022

WORK EXPERIENCES

ByteDance Ltd., San Jose 2024.6-Now
Seed LLM Team
Student Researcher, Host: Jiecao Chen
Building a Synthetic Benchmark/Dataset for Long-Context Reasoning

- We develope an algorithm to create a synthetic benchmark dataset for multi-hop, long-context reasoning.

Qualcomm AI Research, San Diego 2023.6-2023.9
System 2 Team
Interim Engineering Intern, Host: Mingu Lee, Reza Pourreza, Roland Memisevic
Unleashing the Creative Mind: Language Model As Hierarchical Policy For Improved Exploration on Challenging Problem Solving

- Existing LLMs often have limited exploration capabilities in reasoning tasks, even when combined with sampling or tree search methods.
- Our key observation is that LLMs struggle to explore the high-level tactic space effectively.
- We propose an improved exploration strategy by using LLMs as a hierarchical policy, where the high-level policy sets the direction and the low-level policy handles the detailed reasoning steps.
- Details can be found in the paper [1].

Qualcomm AI Research, Remote 2022.10-2023.6
System 2 Team
Support Engineering, Host: Mingu Lee, Roland Memisevic
Deductive Verification of Chain-of-Thought Reasoning

- LLMs can produce unreliable reasoning chains that may contain logical errors and hallucinations.
- We propose a reasoning format called "Natural Program," which requires LLMs to generate reasoning chains in a verifiable format.
- We then use LLMs to perform step-by-step self-verification to filter out invalid reasoning chains and improve the reliability of the reasoning chains.
- Details can be found in the paper [2].

Qualcomm AI Research, Remote 2022.6-2022.9
System 2 Team
Interim Engineering Intern, Host: Mingu Lee, Roland Memisevic
Learning Code Execution with Language Model

- The goal is to determine whether LLMs can execute code as a Turing machine.
- We develope a random code generator that supports loops, conditionals, and function calls.
- We modify the interpreter to collect execution traces of the generated codes for training purposes.
- We train and evaluate the LLMs on the code execution task. Our models can generalize to new programs and achieves high accuracy.
- This work has been filed as a US patent.

X, the moonshot factory, Remote 2020.6-2020.9
Mineral Project

AI Resident, Host: Lianghao Li, Kangkang Wang

Lane detection for agriculture images

- We develope a lane detection algorithm using the Hough transform in Python and accelerate its speed with Cython.

Improved weed detection with lane detection

- We create a weed detection model based on EfficientDet.
- We integrate the lane detection algorithm with the weed detection model to enhance overall weed detection performance.

University of California San Diego, San Diego 2019.9-Now

Su Lab

Graduate Research Assistant, Host: Hao Su

Embodied AI

- We develop generalizable manipulation skill benchmarks, ManiSkill, to evaluate the generalization ability of manipulation skills.
- We develop reinforcement learning algorithms and imitation learning algorithms for robotic tasks.

Computer Vision

- We develop 3D perception algorithms, such as 3D mesh convex decomposition, and 3D part segmentation.
- We integrate 3D representation learning with reinforcement learning algorithms for robotic tasks.

Reasoning

- We develope algorithms to enhance reasoning abilities using LLMs.

TECHNIQUE SKILLS

Programming Language: Python, C, C++.
Deep Learning: PyTorch, Tensorflow, Jax, Pytorch CUDA extension.
Large Models Related Skills: Quantization, Distributed training, Fine-tuning, Pre-training dataset processing.
Parallel Computing: MPI, OpenMP, CUDA, AVX.
Simulation: SAPIEN, MuJoCo.
Additional Skills: Pybind, ROS.

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