Zhan Ling

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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.

EDUCATION

University of California San Diego, La Jolla, California, USA — 2019.9–2024.12
Doctor of Philosophy, Computer Science, Advisor: Prof. Hao Su
Master of Science, Computer Science

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)

PUBLICATIONS AND PREPRINTS

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

1. ActPlan-1K: Benchmarking the Procedural Planning Ability of Visual Language Models in Household Activities. Ying Su, **Zhan Ling**, Haochen Shi, Cheng Jiayang, Yauwai Yim, Yangqiu Song. *Empirical Methods in Natural Language Processing (EMNLP) 2024 Main.*

2. 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.

3. 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.*

4. On the Efficacy of 3D Point Cloud Reinforcement Learning. **Zhan Ling***, Yunchao Yao*, Xuanling Li, Hao Su. Preprint.

5. 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.*

6. 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**.*

7. 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.*

8. 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.*

9. 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.*

10. 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.*

11. 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.*

12. 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.*

13. 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.*

14. 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 2022-2025; ICCV 2021, 2023; ECCV 2022, 2024; NeurIPS 2023-2024; ICLR 2024-2025; ICML 2024-2025; ACCV 2024; ICRA 2025; AISTATS 2025.
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

WORK EXPERIENCES

ByteDance Inc., San Jose   2024.12-Now
Seed-LLM
Research Scientist
Improve function call and

- We create synthetic data for function call and agent training.

ByteDance Inc., San Jose   2024.6-2024.12
Seed-LLM
Student Researcher, Host: Jiecao Chen
Building a Synthetic Benchmark/Dataset for Long-Context Reasoning

- We develop a novel algorithm for generating synthetic long-context reasoning question-and-answer pairs.
- We create a new synthetic long-context reasoning benchmark and evaluate both open-source and closed-source models using the proposed benchmark. The work has been submitted as both a research paper and a patent.

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 [2].

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 [3].

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 develop 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 develop 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 develop 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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