Zichen "Charles" Zhang

(+1) 651-600-5947 | charlesz@allenai.org | zcczhang.github.io | zcczhang | charleszzz | @ZCCZHANG

Education

Macalester College, St. Pual, MN   *Sep. 2019 - Dec. 2022*
GPA 3.95/4.0 **MAJOR GPA** 4.0/4.0   *Mathematics, C.S.*
- Charles J. Turck Presidential Honor Scholarship (Four-year scholarship); School Dean's List (2019 - 2022)

Research Interest

My primary research interest lies in the development of autonomous agents that can effectively operate in dynamic environments, solving real-world puzzles for social good. I am interested in both generalist and specialist agents, with a focus on developing generalizable and effective approaches that can be applied across a wide range of tasks and scenarios.

Research Experience

Predoctoral Young Investigator (PYI)   *Seattle, WA*
PRIOR team, Allen Institute for AI (AI2)   *Dec. 2022 - Present*
- Main contributor to Unified-IO2. Something big is coming!
- Lead the project of *Universal Visual Decomposer: Long-Horizon Manipulation Made Easy*, with the collaboration of people in Upenn and UW.

Research   *Remote*
NVIDIA & Stanford Vision and Learning Lab (SVL)   *May. 2022 - Oct. 2022*
- Join the research with people from NVIDIA and Stanford Vision & Learning (SVL), supervised by Linxi (Jim) Fan and Yuke Zhu.
- Develop and improve the novel multi-modal prompt-driven robotic manipulation tasks suite, VIMABench. Take part in a variety of foundation model implementations for sequence modeling, initial experiments, ablations, and baselines.

Research (Intern)   *Seattle, WA*
PRIOR team, Allen Institute for AI (AI2)   *Sep. 2021 - Dec. 2022*
- Lead the project for Reset-Free RL supervised by *Luca Weihs*. After identifying the main problem is the near-irreversible (NI) states, we build the agent towards only request intervention (reset) when necessary, while nailing generalizations.
- Contribute to the modular and flexible learning framework *AllenAct*.

Summer Research   *St. Paul, MN*
Advised by Professor Lisa Naples, MACALESTER COLLEGE   *Jun. 2021 - Aug. 2021*
- After answering the Traveling Salesman Problem (TSP) in mathematics, develop and prove theorems and lemmas to extend the characterization of geometric measures that are carried by rectifiable curves in the dyadic cube system.

Research   *Beijing, China*
R & D Department, Thorough Images (Now Thorough Future)   *Jan. 2021 - May 2021*
- Lead the project of automated scoring systems for human epidermal growth factor receptor 2 (HER-2) after immunohistochemical (IHC) staining mentored by co-CEO & CTO *Shuhao Wang*.

Summer Research   *St. Paul, MN*
Advised by Prof. Esra Kadioglu Urtis, MACALESTER COLLEGE   *Jun. 2020 - Aug. 2020*
- Develop Q-learning-based and graph-based algorithms with simulations for UAVs coverage.

Publications / Preprints

* indicates equal contribution, † indicates equal advising

Universal Visual Decomposer: Long-Horizon Manipulation Made Easy
Z. Zhang*, Y. Li*, O. Bastani, A. Gupta, D. Jayaraman, Y. Ma†, and L. Weihs†, in submission, 2023
an off-the-shelf method immediately enables RL from vision without reward engineering and compositional generalizations in IL for long-horizon manipulation tasks in sim and real, without any extra training, task knowledge, and costs.

When Learning Is Out of Reach, Reset: Generalization in Autonomous Visuomotor Reinforcement Learning
Z. Zhang and L. Weihs, in submission, Embodied AI workshop at CVPR, 2023
General and effective unsupervised irreversible transition measurements and a single-policy random-goal training framework, allowing agents to learn with much fewer resets and better generalize in positional, cosmetic, and structural variations in both (mobile, continuous) manipulation and navigation domains.

VIMA: General Robot Manipulation with Multimodal Prompts
Y. Jiang, A. Gupta, **Z. Zhang***, G. Wang*, Y. Dou, Y. Chen, L. Fei-Fei, A. Anandkumar, Y. Zhu[†], and L. Fan[†], ICML 2023, NeurIPS workshop on Foundation Models for Decision Making (**oral**), 2022*
A transformer that ingests multimodal prompts and controls a robot arm for a wide range of manipulation tasks.

Automated Scoring System of HER2 in Pathological Images under the Microscope
Z. Zhang, L. Wang, and S. Wang, 18th European Congress on Digital Pathology (ECDP), 2022
Research paper for automatically recognizing and scoring HER-2 status under pathological images with interpretable procedures.

Characterization of Rectifiable Measures Carried by Lipschitz Curves
Z. Zhang, Y. Wu, and L. Naples, JMM Contributed Paper Session, AMS-PME Poster Session, 2022
Accepted for Joint Mathematics Meeting (JMM) 2022, AMS Contributed Paper Session on Functions of Complex Variables, Measure, and Integration Theory (**1** of **6** presenters), and America Mathematical Society-Pi Mu Epsilon (AMS-PME) Poster Session.

Area Coverage with Unmanned Aerial Vehicles Using Reinforcement Learning
Z. Zhang, E. Landgren, F. Zhang, A. Gould, and E. Kadioglu-Urtis, Preprint, 2020
Research paper for summer research at Macalester mentored by Esra Kadioglu Urtis (now at Wake Forest University).

Teaching

Teaching Assistant at Macalester College

Fall 2022	**COMP 484: Intro to Artificial Intelligence**
Spring 2022	**MATH 378: Complex Analysis**
Fall 2021	**STAT/COMP 112: Intro to Data Science**
Spring 2021	**COMP 394 Topics Course: Reinforcement Learning** design and write code implementations for homework and class materials
Fall 2020	**COMP 128: Data Structure**
Spring 2020	**STAT/COMP 112: Intro to Data Science**

References

Luca Weihs, *Research Manager, Allen Institute for AI, lucaw@allenai.org*
Yuke Zhu, *Assistant Professor, UT Austin, yukez@cs.utexas.edu*
Linxi (Jim) Fan, *Senior Research Scientist, NVIDIA, linxif@nvidia.com*
Susan Fox, *DeWitt Wallace Professor and Department Chair, Macalester College, fox@macalester.edu*
Shuhao Wang, *CTO, co-CEO, Thorough Future, eric.wang@thorough.ai*