Feiyu "Gavin" Zhu

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EDUCATION

Carnegie Mellon University School of Computer Science Aug. 2020 – May 2024
B.S. in Artificial Intelligence with additional major in Cognitive Science *(QPA 4.0/4.0)* *Pittsburgh, PA, USA*
Thesis (work in progress): Incorporating Instructive Feedback in Human-AI Interaction

RESEARCH EXPERIENCE

Research Assistant *(Advisor: Prof. Reid Simmons)* Feb. 2021 – Present
Reliable Autonomous Systems Lab, Carnegie Mellon University *Pittsburgh, PA, USA*
- Developed a cognitive architecture for embodied agents for household tasks
- Developed a bootstrapping framework to use large language models to initiate cognitive agents
- Developed behavior cloning and imitation learning models with LSTM backbones
- Developed decision-tree-based agents that execute human-like strategies
- Conducted and analyzed online user study for partnering with human players in Hanabi
- Present to Amazon collaborators monthly

Research Assistant *(Advisor: Prof. Alexander Mathis)* May 2022 – Jan. 2023
Center for Neuroprosthetics, École Polytechnique Fédérale de Lausanne (EPFL) *Geneva, Switzerland*
- Built random forest model for healthy subjects' movement trajectory classification
- Developed weakly supervised local feature descriptor for localization and evaluation of stroke-related movements
- Experimented with rendering tools based on SMPL models for better annotations
- Built Fugl-Meyer Assessment estimator for stroke patients performing activities of daily living
- Explored intrinsic properties of stroke/healthy movement trajectories with functional PCA

Research Assistant *(Advisors: Prof. Yonatan Bisk, Dr. Chris Paxton [NVIDIA])* Feb. 2021 – Dec. 2021
Connecting Language to Actions & the World Lab, Carnegie Mellon University *Pittsburgh, PA, USA*
- Worked on multimodal action anticipation in the kitchen environment with transformer models
- Designed crowd-sourcing interface for kitchen video data annotation on AWS Mechanical Turk
- Implemented video summarization algorithm for video processing
- Analyzed egocentric kitchen videos using SpaCy (for natural languages) and PyTorch (for images/videos)

Intern *(Advisor: Dr. Guyue Zhou)* Dec. 2020 – Feb. 2021
Institute for A.I. Industry Research (AIR), Tsinghua University *Beijing, China*
- Designed customizable robot and educational games for 4-8th grade STEM education
- Developed object detection toolkit on Kendryte K210 MCU

Research Intern *(Advisors: Xi Qiu, Jianan Wu)* Aug. 2019 – Sep. 2020
Megvii Inc. (Face ++) *Beijing, China*
- Researched in automatic parameter optimization and self-supervised feature extraction in pedestrian tracking
- Developed and maintained pedestrian tracking module in video structuralization pipeline
- Designed drone-based electric grid visual inspection algorithm for China Southern Power Grid

PUBLICATIONS

Bootstrapping Cognitive Agents with a Large Language Model (acceptance rate 23.75%)
in *The AAAI Conference on Artificial Intelligence (2024)*
Feiyu Zhu, Reid Simmons

SQE: Self Quality Evaluation Metric for Parameters Optimization in Multi-Object Tracking (acceptance rate 25.01%)
in *CVF/IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2020*
Yanru Huang, **Feiyu Zhu**, Zheni Zeng, Xi Qiu, Yuan Shen, Jianan Wu

Honors and Awards

Summer Undergraduate Research Fellowship, *Carnegie Mellon University*	Jun. 2023
Member, *Mortar Board*	Apr. 2023
Member, *Psi Chi, The International Honor Society in Psychology*	Jan. 2023
Summer@EPFL Research Fellowship, *École Polytechnique Fédérale de Lausanne (EPFL)*	Aug. 2022
ThinkSwiss Research Scholarship, *Embassy of Switzerland in Washington, D.C.*	Feb. 2022
Dean's List, High Honors, *School of Computer Science, Carnegie Mellon University*	All semesters
Outstanding Intern, *Megvii Inc.*	Dec. 2019, Jan. 2020, Feb. 2020
Finalist, *2019 Intel International Science and Engineering Fair (ISEF)*	May 2019

Teaching Experience

Teaching Assistant *(Primary Instructor: Prof. Stephanie Rosenthal)* — Aug 2022 – Present
CMU 15-281 Artificial Intelligence: Representation and Problem Solving — Pittsburgh, PA, USA
- Head TA for Fall 2023
- Design and grade written assignments
- Lead weekly recitation with 30 students
- Hold weekly office hours and midterm review sessions
- Answer students' questions online
- Interview TA candidates for future semester

Teaching Assistant *(Primary Instructor: Prof. Reid Simmons)* — Jan. 2022 – Present
CMU 07-180 Concepts in Artificial Intelligence — Pittsburgh, PA, USA
- Head TA for Spring 2023, Spring 2024
- Prepare lecture and recitation materials on deep learning
- Design and grade written and programming assignments and the final exam
- Hold weekly office hour
- Answer students' questions online
- Interview TA candidates for future semester

Course Projects

Natural Language Instruction Following *(Advisor: Prof. Yonatan Bisk)* — Jan. 2023 - May. 2023
Team course project for CMU 11-777 Multi-modal Machine Learning (Graduate)
(with Daphne Chen, Jiatai Li, Hariharan Manikandan, Himanshu Thakur)
- Working on embodied agent instruction following on the Alfred dataset
- Incorporating visual modality into sub-task decomposition
- Developing explicit memory scene graph for semantic map search

Robot Planning for Household Tasks *(Advisor: Prof. Maxim Likhachev)* — Mar. 2023 - May. 2023
Team course project for CMU 16-350 Planning Techniques for Robotics *(with Nick Alvarez, Helen Mao)*
- Developing an online robot planner for household tasks in the AI2THOR environment

Few-Shot Preference Learning *(Advisors: Prof. Henny Admoni, Michelle Zhao)* — Sept. 2022 - Dec. 2022
Team course project for CMU 16-867 Human-Robot Interaction (Graduate) *(with Daphne Chen)*
- Developed a nearest neighbor model for few-shot preference learning through interaction in the kitchen domain
- Conducted user study on assistive agents with preference adaptation
- Built an interface based on AI2THOR simulator for user study

Visual False Memory Experiment *(Advisor: Dr. Abigail Noyce)* — Oct. 2022 - Nov. 2022
Individual course project for CMU 85-211 Cognitive Psychology
- Extended the false memory experiment from a list of words to a list of images (cartoon cat faces)
- Generated the list of cartoon cat faces and synthesized the critical lures
- Built an online interface and hosted it on AWS for human participants study
- Conducted statistical analysis based on the results

Hanabi Agent in ACT-R *(Advisors: Prof. John Anderson, Dan Bothell)* — Apr. 2022 - May 2022
Individual course project for CMU 85-412 Cognitive Modeling
- Developed an ACT-R model for simulating human cognition in playing the cooperative board game Hanabi
- Achieved human comparable performance

Skills

Programming Languages: Python, C, SML, HTML
Programming Libraries: Pytorch, Tensorflow, spaCy, scikit-learn, NumPy, OpenCV, lightgbm, ACT-R
Other Tools: LaTeX, Unix, Vim, Git, Docker, Markdown
Languages: Chinese (Native), English (Native), French (Elementary)

References

Prof. Reid Simmons, *Carnegie Mellon University*   Research advisor; Academic advisor
Prof. Alexander Mathis, *École Polytechnique Fédérale de Lausanne (EPFL)*   Research advisor
Prof. Yonatan Bisk, *Carnegie Mellon University*   Research advisor
Prof. Stephanie Rosenthal, *Carnegie Mellon University*   Course instructor for teaching assistantship