Run Peng

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EDUCATION

University of Michigan, Ann Arbor – Ph.D. in *Computer Science & Engineering* *Sep.2024 – Apr. 2028 (expected)*
- MS in *Computer Science & Engineering* *Sep.2022 – Apr. 2024*
- BSE in *Computer Science* & Engineering *Sep.2020 – Apr. 2022*

Shanghai Jiao Tong University - BSE in *Electrical and Computer Engineering* *Sep.2018 – Aug. 2022*

PUBLICATIONS (Listed in order of personal interest)

Towards A Holistic Landscape of Situated Theory of Mind in Large Language Models

*Ziqiao Ma, Jacob Sansom, **Run Peng**, Joyce Chai; EMNLP 2023 Findings* *Jun 2023 – Nov 2023*

- Collaboratively designed and executed ten distinct tasks in a 2D grid-world environment, accommodating both single and multi-agent scenarios. Engaged in a comprehensive comparison study, assessing the performance of Large Language Models (LLMs) across seven facets of Theory of Mind.

Go Beyond Imagination: Maximizing Episodic Reachability with World Models

*Yao Fu, **Run Peng**, Honglak Lee; ICML 2023 Poster* *Dec 2022 – Mar 2023*

- Pioneered a unique method integrating long-term experience and episodic memory in exploration, designed intrinsic motivation for policy learning, which further enhanced computational modeling.
- Successfully implemented four benchmark baselines, ranging from procedurally generated sparse-reward 2D environments to continuous control domains, reinforcing its broad applicability and robustness.

Learning Exploration Policies with View-based Intrinsic Rewards

Yijie Guo, Yao Fu*, **Run Peng**, Honglak Lee; NeurIPS 2022 DeepRL Workshop* *Apr 2022 – Aug 2022*

- Performed hypothesis testing, and ablation studies of a novel intrinsic reward design for reinforcement learning; Succeeded in both 2D and 3D environments, and under both task-oriented and task-agnostic settings. Our model significantly outperforms the SOTA.

Think, Act, and Ask: Open-World Interactive Personalized Robot Navigation

*Yinpei Dai, **Run Peng**, Sikai Li, Joyce Chai; ICRA 2024* *Aug 2023 – Oct 2023*

- Implemented the whole pipeline for personalized object navigation with GPT as backbone, the sim-to-real conversion, prompt designing, backbone-system coding, experiments execution, and evaluation.

Exploring LLM in Intention Modeling for Human-Robot Collaboration

*Sikai Li, **Run Peng**, Yinpei Dai, Jenny Lee, Joyce Chai; IROS 2023 Late Breaking Result* *Jul 2023 – Oct 2023*

- Engineered an innovative robot-human collaboration framework, where a human and robot cooperatively negotiate and execute tasks. Successfully integrated LLM for real-time human intention modeling for better collaboration.

Smart Agent-Based Modeling: On the Use of Large Language Models in Computer Simulations

*Zengqing Wu, **Run Peng**, Xu Han, Shuyuan Zheng, Yixin Zhang, Chuan Xiao; preprint* *Jul 2023 – Oct 2023*

- Executed a comprehensive case study on emergency evacuation simulation with LLM agents; 100+ agents are simultaneously involved in a room, where they need to escape as soon as they can; Agents are controlled by GPT4, assigned with different personas, and can communicate with their surroundings.

Shall We Team Up: Exploring Spontaneous Cooperation of Competing LLM Agents

Zengqing Wu, **Run Peng***, et.al; EMNLP 2024 Findings* *Feb 2024 – Jun 2024*

- Successfully simulated spontaneous cooperation under competitive scenarios with LLM agents. This supports Computational social science community for conducting more realistic social simulation, as well as AI community for testing LLM's deliberate reasoning ability under counter-intuitive scenarios.

RESEARCH & PROJECT EXPERIENCE (*)

CommonGrid: Building Common Ground through Belief Maintenance in Situated Communication

Advisor: Joyce Chai, University of Michigan, with her PhD student Ziqiao (Martin) Ma *Dec 2023 – Present*

- Developed a collaborative benchmark within a 2D grid-world environment, emphasizing the maintenance of first and second-order beliefs among multiple agents during collaborative tasks. Implemented an innovative online interactive platform for data collection.
- Applied Reinforcement learning and LLM post-training for collaborative task completions and belief maintenances. This approach aimed to explore the impact of establishing and maintaining common ground through communication on the overall efficiency and effectiveness of collaborative efforts.

Robotics Object Tracking with Humans in the Loop

Advisor: Joyce Chai, University of Michigan, with her PhD student Ziqiao (Martin) Ma *Jan 2023 – Present*

- Conducted comprehensive research on the performance of traditional Computer Vision (CV) tasks within real-world robotics contexts, focusing particularly on the impact of human activities leading to alterations in object states.
- Collected and analyzed a multi-object tracking dataset, captured in a residential-like setting using a physical robot.

Unsupervised Task Clustering with Multi-routed Policy Network

Advisor: Honglak Lee, University of Michigan, with his PhD student Yijie Guo *Oct 2021 – Mar 2022*

- Implemented a multi-routed policy network and applied unsupervised clustering to enable automatic task assignment.
- Investigated AI's behaviors under different dynamics and reward functions; Figured out the generalization quality.

Lightweight of Low light Video Enhancement Algorithm

Advisor: Yinqiang Zheng, University of Tokyo *May 2021 – Dec 2021*

- Improved low-light video quality by designing a novel neural network that places attention on binary binning.

INTERNSHIP

LG AI Research Ann Arbor, MI, US

ML Research Engineer *Sep 2023 – Dec 2023*

- Implemented whole evaluation pipeline for modularized 3-step GPT-based dialog system (including NLG, DM, and NLU modules); Implemented GPT-based end-to-end baseline for comparison study.
- Implemented GPT-evaluator that is able to automatically generate human-like judgements on the overall performance of dialog systems; Enabled a low-cost, highly-reliable substitution of human evaluators.
- Designed GPT-as-agent module that simulates users to interact with dialog systems; By specifying user requirements and personas, various user behaviors and scenarios can be largely covered with relatively small amount of trials.

INTSIG（Key App products: CamScanner, CamCard） Shanghai, China

Algorithm Engineer *Aug 2020 – Jan 2021*

- Extended Kubernetes & K3S to Cloud deployment construction; Designed automatic, minimized installation method for small companies without scaled web clusters or related engineers.
- Constructed Lua SDK of mockserver for web testing to raise efficiency of coordination between front and back-end; Constructed Lua SDK of SQL (mysql, postgres) code format correction for preventing SQL injection.

PAPER REVIEW

Conferences:

- **Natural Language Processing:** EMNLP 2023, NAACL 2024, COLM 2024
- **Machine Learning:** NeurIPS 2024, ICLR 2024 LLM-Agents Workshop
- **Human Robot Interaction:** HRI 2024 Late Breaking Results, CHI 2024

Journal:

- **Simulation:** Journal of Simulation

TEACHING EXPERIENCE

EECS484 Database - *Instructional Aide at University of Michigan* *May 2022 – Jun 2022*

- Presented 1-hour in-person discussions twice a week for 80+ students; Opened 4-hour office hours per week on average.
- Designed 2 exam questions, mainly on topics related to Relational Algebra, Memory and Transaction.

VE281 Data Structures and Algorithms - *Teaching Assistant at Shanghai Jiao Tong University* *May 2021 – Aug 2021*

- Responsible for designing assignments (alone), exams (co-work) and giving recitation classes every week.

AWARDS & HONORS

- Dean's List & University Honors, University of Michigan, Ann Arbor *Dec 2020 & Apr 2021*
- Scholarship for Academic Excellence, UMJI-SJTU, Shanghai *Aug 2019*
- Honorable Mention in Mathematical Contest in Modeling *May 2019*
- First Prize of National Olympiad in Informatics in Provinces, Shanghai, China *Dec 2016*

SKILLS

Computer: Pytorch, Tensorflow, python, C/C++, Lua, Matlab, Kubernetes, SQL

Fields: NLP, LLM, Reinforcement Learning, Deep Learning, Embodied AI, Computer Vision, Robotics, Networking

Languages: English (Fluent, TOEFL: 109, IELTS: 7.5), Japanese (Native, JLPT-N1)