Xiang **Gao**

Undergraduate Student

8-3-202, 10 Lutuan Road, Changping, Beijing, 102209, People's Republic of CHINA

(+86) 152-1050-8825 | xgao242424@gmail.com | zcszcs522

Third-year Computer Science undergraduate at Tsinghua University (Yao Class) with expertise in multi-agent RL, multimodal LLMs, and data scheduling

Education

Tsinghua University — *Beijing, China*

Aug. 2022 - present

- Junior of IIIS (Yao class)
- Graduated from The High School Affiliated to Renmin University of China
- Major: Computer Science
- Courses: C++ programming (GPA 4.0, A+), Calculus (GPA 4.0, A+), Computation theory (GPA 4.0), Advanced computer graphics (GPA 4.0), Distributed system and operating system (GPA 4.0), Game Theory (GPA 4.0), Computer system architecture (GPA 4.0), and Machine learning (GPA 3.6) etc.
- Professional GPA: 3.81/4.0.

Research Experience

Beijing, China

TAIC(Tentative Anticipatory Intention Communication) - the communication between good agents about their strategies in RL — *Oct. 2023 - present*

- **Advisor: Prof. Zhixuan Fang (IIIS, Tsinghua University)**
- In traditional communication mechanisms in multi-agent RL, the messages are often about the observations.
- Aiming to integrate an agent's action tendencies into communication mechanisms to enhance cooperation among agents.
- Use MPE environments as our evaluation benchmark. Focus on the performance in a limited area with limited number of agents.
- Achieved over 10% performance improvement across multiple MPE environments.
- Also interested in the effect of adversary agents in multi-agent systems.
- Responsible for the evaluation on most of the benchmark models.

Seattle, US

Rho loss for VLM2Vec - data scheduling to accelerate the training — *Feb. 2025 - present*

- **Advisor: Prof. Simon Shaolei Du (Paul G. Allen School, University of Washington)**
- Models like VLM2Vec can reach a good performance on different categories of tasks simultaneously, but the training process is quite long and some performance has space for improvements.
- Applying data scheduling methods (e.g. Rho loss) on VLM2Vec to accelerate the pretraining process.
- Using CLIP-like models as the teacher model to reduce the difference between loss in trained models and common comparative models.
- Modifying the codes for VLM2Vec to help integrating the selection process.
- Using distinct metrics to do the evaluation.

Seattle, US

COCO-Facet - a new benchmark showing the significance of promptable embeddings for attribute-focused image retrievals — *Mar. 2025 - May 2025*

- **Advisor: Prof. Simon Shaolei Du (Paul G. Allen School, University of Washington)**
- CLIP and similar models have good capabilities on matching image and text, but they lack flexibility when we only focus on some attributes of the images.
- Developed benchmarks demonstrating a >10% advantage of generative models over comparative models in text-to-image retrieval tasks.
- Evaluating the benchmarks with different baseline models (including the design of the interface to adapt the model to our data), the prompts can add about 5 percent to the final performance.
- Designing prompts in the generative-based models with human effort and LLM APIs, showing they both have some outperformances.
- Identifying some problems with the existed models on the retrieval tasks, including lack of robustness to deceptive attributes.

Remote, US

Risk Sensitive MARL - an approach to more appropriate equilibrium in coordination games — *Jun. 2025 - present*

- **Advisor: Prof. Kaiqing Zhang (University of Maryland)**
- In many environments, a positive payoff and a negative payoff are not equivalent.
- Introducing risk parameters with exponential forms.
- Trying to promote the replicator to non-fully connected settings, trying to prove the convergence with risk parameters.

Course Project

IIIS *Beijing, China*

Sep. 2022 - present

- Played a major role in a project of simulation in graphics, integrating rendering and physical properties of solid and fluid objects. Our group was the first to successfully implement both translation and rotation of solid objects in collision simulations.
- Finished projects in classes (network, system, blockchain etc.) and dove into the implementation of some architectures. Did a good job in implementing Multicast in a routing network of Garnet. (We are actually the only group to finish the difficult topic of multicast that year)
- Did a small project based on the result of Entropy-MCMC on my own in a good manner and learnt some methods of machine learning.

Activity

China

Sep. 2022 - present

- Participated in the 2023 Shanghai Jiaotong University-Tsinghua University-Peking University Computer Science ”Growth Partner” International Summer School and communicated with outstanding scholars and students at home and abroad.
- Participated in the summer research camp of ”Exploring Anhui and Visiting Cultural Heritage”, and undertook research and publicity activities.
- Visited some alumni companies(e.g. Taichi Graphics) and laboratories(e.g. Shanghai AI lab) and communicated with the entrepreneurs and engineers. Got some ideas in Multi-agent RL when discussing with an engineer.
- Actively participated in the international exchange activities organized by the ”Global Competence” organization on campus, and exchanged questions with Brazilian Ambassador to China Marcos Galvao.
- Participated in volunteering activities and chorus on and off campus many times.
- Willing to participate in class and department work and activities.

Awards

Tsinghua University

2022

- A freshman scholarship in college.