

I am a junior undergraduate student (class of 2022) at Shanghai Jiao Tong University (SJTU), majoring in Computer Science. I'm writing to apply for a summer research opportunity in 2021.

I took a machine learning course during the second semester of my freshman year. I felt a sense of beauty while making computers 'learn' by themselves, and I enjoyed designing algorithms for this learning process, which led to my first step of academic research in APEX Lab. I have been working as a research intern at APEX Lab since Jun 2019, advised by Prof. Weinan Zhang. This research experience at APEX Lab gave me a systematic training in deep learning and academic research. I found myself obsessed with many topics related to artificial intelligence, especially reinforcement learning (RL). Both theoretical analysis and real-world applications make me very excited.

However, as I tried to implement RL algorithms, I found the instability performance of RL, and a successful RL result is highly related to a well-designed reward function. Because of these problems, learning from experts (that is, imitating learning) is very meaningful and a natural way towards real-world RL applications. I have been trying to improve imitation learning algorithms for the past one year. I began with the idea of recovering a fixed reward function from expert demonstrations, and thus I applied score-matching to estimate the energy of the expert's occupancy measure. Recently, our paper 'Energy-based Imitation Learning' has been accepted for publication at AAMAS 2021. However, when I was experimenting on 'Energy-based Imitation Learning', I found that most of the current algorithms are difficult to solve the problem of multi-expert (multi-modal) imitation learning. But the multi-modal phenomenon is very common in real-life applications like autonomous driving (e.g., In reality, there are aggressive drivers and conservative drivers). To solve the problem that I accidentally discovered during the last period of research, I have been working on how to make agents learn from multi-modal data recently.

[DIY]

Prof. Yue, your tutorial with Hoang Le at ICML 2018 open the door to imitation learning for me when I was a freshman. I have been following your group's works (especially the work of Hoang Le on imitation learning) since 2019. I have been a crazy fan of sports ever since I was eight years old. It is indeed a treat to read your papers on applying imitation learning to football and basketball. Your works are to make imitation learning shine in the real world.

I found my research experience and interests perfectly fit your previous works on imitation learning. It would be wonderful if you could offer me a research intern opportunity in your group.

[/DIY]

In all, applying for the research intern opportunity is not an instant enthusiasm but with a careful decision. I strongly believe my choice to send an application for a position in your lab is the best decision to be made, and your positive consideration of my application is much appreciated!