Yao Mu
Address: Beijing, China
Email : muy18@mails.tsinghua.edu.cn
Mobile : +86-18519115141

Bio

I got my bachelor's degree from the Department of Vehicle Engineering, Harbin institute of technology (C9, Double First Class) with **GPA of 92.01/100, ranking 1/135 (top 0.74%)** and obtained the **Excellent Provincial Graduates** and **Triple-A Student Pacesetter**. I am currently a master student at the School of vehicle and motion, Tsinghua University (QS:15, C9, Double First Class), with the current **GPA of 3.78/4.0, ranking 17/64**.
I have received **4 Scholarships**, including **National scholarship 3 times** and Principal first-Class Scholarship. I have earned myself with **5 national/international competition awards** and **4 provincial prizes**.
I have published **1 conference paper** as the first author, and obtained the **Student Best Paper Award** in the **20th ICCAS** (International Conference on Control, Automation and Systems), **1 journal paper** as the first author under review (minor revision) Besides, I have also **submitted 1 paper to ICLR** (International Conference on Learning Representations 2021, *TH-CPL A class*) as the fist author and 1 conference paper to **ECC** (European control conference 2021, *top 3 in control field*) as second author.
My research interest focus on **reinforcement learning** and its applications on **autonomous driving**. I am improving the representation of system dynamics to promote data efficiency.

Education

- **Tsinghua University (C9, Double First Class)** China
  Master in intelligent vehicle Engineering; ***GPA: 3.78/4.0; Ranking 17/64*** *Sep. 2018 – Present*
  - In year 2020, Tsinghua University ranks the 1^{th} in QS Chinese University Ranking and ranks the 13^{th} in QS international University Ranking.
  - Courses with full marks 4.0: "Algorithm Analysis and Design" "Optimal Control" "Applied Stochastic Processes" "Advanced Machine Learning" "Intelligent Transportation Systems Modeling and Simulation" "Statistical Learning Theory and Applications" "Reinforcement Learning and Control" "Vehicle Control Engineering".
- **Harbin institute of technology (HIT, C9, Double First Class)** China
  Bachelor in Vehicle Engineering; ***GPA: 92.01/100; Ranking 1/135 (Top 0.74%)*** *Sep. 2014 – Jun. 2018*
  - Graduated with the honor of "Provincial Excellent Graduate" of Harbin institute of technology. (Top 10%)
  - Graduated with the honor of "Provincial Triple-A Student Pacesetter". (***Top 0.4%***, 10 out of 2400 students)

Honours and Awards

- **Scholarships**
  - National Scholarship for 2014/2015 academic year (***Top 1%***, 2 out of 135 students in HIT)
  - National Scholarship for 2015/2016 academic year (***Top 1%***, 2 out of 135 students in HIT)
  - National Scholarship for 2016/2017 academic year (***Top 1%***, 2 out of 135 students in HIT)
  - First-Class Scholarship for 2014/2015 academic year (***Top 10%***, 13 out of 135 students in HIT)
- **Academic Competitions Awards**
  - Student Best Paper Award in the 20th International Conference on Control, Automation and Systems (ICCAS) (***Top 1%*** 5/500 among accepted papers from 25 countries)
  - 2^{st} Prize of National College Student Energy Conservation and Emission Reduction Competition (***Top 5%*** in China)
  - Meritorious Winner Award in Interdisciplinary Contest in Modeling (***Top 13%*** worldwide)
  - 2^{nd} Second Prize of National College students Ocean Vehicle Design and Production competition (Top 5% in China)
  - 3^{rd} of National College Student Mathematics Competition (***Top 10%*** in China)
  - 1^{st} Prize (provincial) of National College Student Mathematical Modeling Competition (***Top 10%***, in China)
- **Honours**
  - Provincial excellent student award (***Top 1%*** in HIT)
  - Provincial excellent graduates (***Top 5%*** in HIT)
  - Provincial Triple-A Student Pacesetter (***Top 3%*** in HIT)
  - Outstanding League Member (***Top 10%*** in HIT)

Publications

- **Conference Proceedings**
  - **[1] Yao Mu**, Baiyu Peng, et al. Mixed Reinforcement Learning for Efficient Policy Optimizationin Stochastic Environments[C]. International Conference on Control, Automation and Systems (ICCAS) 2020 (**Student Best Paper Award**) .
  - [2] **Yao Mu**, Yuzheng Zhuang, et al. Robust Memory Augmentation by Constrained Latent Imagination[C]. Submit to **International Conference on Learning Representations (ICLR 2021)** .
  - [3] Baiyu Peng, **Yao Mu**, et al. Model-Based Actor-Critic with Chance Constraints[C]. Submit to **European Control Conference (ECC 2021, top 3 conference in control field)**.
- **SCI Journals**
  - [4] **Yao Mu**, Shengbo Li, et al. IEEE Transactions on Automation Science and Engineering[J]. Submit to IEEE Transactions on Automation Science and Engineering,**minor reversion**.

Research/Work Experience

- **Huawei Noah's Ark Lab** Beijing, China
  Research Internship in Reinforcement learning *May. 2020 - Nov. 2020*
  - **Huawei Noah's Ark Lab**: The Noah's Ark Lab is the AI research center for Huawei Technologies. The lab's mission is to make significant contributions to both the company and society by innovating in artificial intelligence, data mining, and related fields.
  - **Work Duty**: Inspired by a neuroscience experiment of "forming artificial memories during sleep," a robust memory augmentation method is proposed with Constrained Latent ImaginatiON (CLION) under a novel actor-critic framework, which aims to speed up the learning of the optimal policy with virtual episodic. Various experiments on high-dimensional visual control tasks with arbitrary image uncertainty demonstrate that CLION outperforms existing approaches in terms of data-efficiency, robustness to uncertainty, and final performance. **This research work is submitted to ICLR 2021**.
- **Sensetime** China
  Research Internship in Computer vision *Jan. 2019 - Aug. 2019*
  - **Sensetime AI Research Center**: SenseTime is a leading global company focused on developing AI technologies that advance the world's economies, society and humanity for a better tomorrow. It is also the world's most-funded AI pure-play with the highest valuation.
  - **Work Duty**: Mainly responsible for the research of interpretable feature extraction, we extracted human-understandable features such as object position, material characteristics, light source position, light source type in the picture. For rendering the image realistically, we used a physical rendering engine as the simulator. We designed an MDP process for the feature inference and used a physical rendering engine as the simulator for realistic rendering performance. The optimal interpretable feature is inferred by reinforcement learning due to its non-differentiability.
- **ForwardX Robotics** China
  Research Internship in Reinforcement learning *May. 2018 - Aug. 2018*
  - **ForwardX**: ForwardX Robotics is the world's only developer of intelligent robotics to realize wide-scale commercial deployment of vision-first Autonomous Mobile Robots (AMRs) across a number of industries, such as logistics, manufacturing, and retail. Headquartered in Beijing, China, ForwardX has domestic locations in Shanghai and Shenzhen and a North American base in Phoenix, Arizona.
  - **Work Duty**: Mainly realized the structure design, parameter optimization, and landing of Target-driven Visual Navigation in Indoor Scenes using Deep Reinforcement Learning algorithm.
- **Mixed Reinforcement Learning Algorithm for Autopilot Decision Making** China
  Lead researcher *Aug. 2018 - Feb. 2019*
  - **Key contributions**: This project focus on how to solve the optimal driving policy in roundabout efficiently and accurately. The optimal policy is searched by model-based reinforcement learning, and the model uncertainty is considered as the confidence to reweight the samples' importance, aiming to reduce the instability due to model error.
- **Development of Mixed Actor-Critic Algorithm for Continuous Control** China
  Lead researcher *Feb. 2019 - Feb. 2020*

- **Key contributions**: We present a mixed actor-critic (MAC) algorithm by simultaneously using dual representations of environmental dynamics to search the optimal policy to improve both learning accuracy and training speed. As a result, the additive stochastic model uncertainty's compensation is embedded inside the policy iteration RL framework, and convergence and the recursive stability are proved. This article is currently submitted to IEEE Transactions on Automation Science and Engineering, Link: https://arxiv.org/abs/2003.00848

- **Model-Based Actor-Critic with Chance Constraints for Stochastic System** China
  Key researcher *May. 2020 - Nov. 2020*
  - **Key contributions**: We propose a model-based chance-constrained actor-critic (CCAC) algorithm which can efficiently learn a safe but not conservative policy. CCAC directly solves the original chance-constrained problems through the exterior point methods, where the objective function and safe probability is simultaneously optimized with adaptive weights. To improve the convergence rate, CCAC utilizes the gradient of the dynamic model to guide policy optimization. The effectiveness of CCAC is demonstrated by an aggressive car-following task.

Leadership Experience/Activities

- **Department science and technology innovation centre in China** China
  Chairman *Nov. 2017 - Sep. 2018*
  - Organized many large-scale scientific and technological innovation competitions
  - Organized many technical training activities to build a bridge to scientific research for junior students in the department.
  - Elected as excellent student cadres (3/100 among all the student cadres)

- **The university's learning promotion centre** China
  The founder and the first chairmen *May. 2016 - Nov. 2017*
  - Provided students with a multimedia seminar room for academic discussion.
  - Organized a number of activities on professional knowledge, literature research, overseas study experience exchange.

- **School's Student Organization Department of the Youth League Committee** China
  Minister of in the school of vehicle and motion, Tsinghua University *Sep. 2018 - Jun. 2019*
  - Responsible for the Youth League branch of the Academy's ideological and organizational construction.

- **GAC Toyota Cup automobile marketing competition** China
  Team leader *June. 2017*
  - won the second place in the national top ten finals.
  - The marketing plan of "new Toyota Camry" was put forward, and received the unanimous praise from the judges of the enterprise.

- **The 2017 United Nations Global Innovation camp for sustainable development** China
  Team leader *Aug. 2017*
  - Cooperated with the students from Harvard University, Switzerland, the University of Edinburgh in the UK and other internationally renowned universities.
  - Using advanced methods and cutting-edge technologies to provide practical solutions and solutions for sustainable development goals jointly.

- **Didi international summer camp** China
  Team leader *Sep. 2019*
  - Participated in the academic seminar on intelligent transportation and the hacker marathon sponsored by Didi Chuxing with teachers and students from the University of Sao Paulo.
  - Designed new functions of taxi service software for the disabled.

Skills

- **Programming Language**: Matlab(Expert), Python(Expert), Pytorch(Expert), C(Intermediate), Java(Inter-mediate), TensorFlow(Intermediate)
- **Softwares**: Git, Pycharm, Visual Studio, Microsoft Office