

JIALU GAO

email: gaojl19@mails.tsinghua.edu.cn | phone: +86 13811565993 | personal page: gaojl19.github.io

RESEARCH INTERESTS

Real Robot Learning, Efficient Imitation Learning, Multi-task Learning, Diffusion Models, Representation Learning, Generalization

EDUCATION

TSINGHUA UNIVERSITY Bachelor of Computer Science and Technology

Sep 2019 – Jun 2023(expected)

GPA: 3.74/4.00

- **Computer Science Courses:** Object-oriented Programming, Data Structure and Algorithm, Operation System, Compiler, Computer Network Security Technology, Assembly Language Programming, Introduction to Artificial Intelligence, Introduction to Machine Learning, Pattern Recognition, Computer Architecture.
- **Math Courses:** Calculus A, Discrete Mathematics, Advanced Linear Algebra, Complex Functions and Equations of Mathematical Physics, Statistical Computing and Software, Probability and Statistics, Introduction to Bayesian Statistics

PUBLICATION

A Dual Representation Framework for Robot Learning with Human Guidance

Dhruva Bansal, Ruohan Zhang, Yilun Hao, Ayano Hiranaka, **Jialu Gao**, Chen Wang, Roberto Martín-Martín, Li Fei-Fei, Jiajun Wu. The Conference on Robot Learning (CoRL) 2022

The Origin of CBRAM With High Linearity, On/Off Ratio, and State Number for Neuromorphic Computing

Yanming Liu, **Jialu Gao**, Fan Wu, He Tian, Tian-Ling Ren.

IEEE Transactions on Electron Devices, 2021.

LANGUAGE SKILLS

English – High proficiency

- TOFEL 113 (R28 L30 S28 W27) GRE 332 (V162 Q170 W3.5)
- CET-4 689/710, CET-SET4 A

ACADEMIC EXPERIENCES

Human in the loop RL *Stanford SVL*

May 2022 – Oct 2022

- Under the guidance of **Jiajun Wu** and **Fei-fei Li**, explore sample-efficient framework for robot learning under human guidance.
- Propose a Dual Representation Framework using scene-graph as high-level abstract representation to facilitate efficient query selection schemes for sample-efficient preference learning algorithms.
- Design and run experiments both in simulation and real-world settings which validates the usefulness of our proposed algorithm.
- The paper “A Dual Representation Framework for Robot Learning with Human Guidance” is accepted at CoRL 2022.

Concurrent Imitation Learning *Stanford CogAI*

Mar 2022 – Jun 2022

- Under the guidance of **Huazhe Xu** and **Ruohan Zhang**, explore a new multi-task learning setting called “Concurrent Multi-task learning”, which aims to learn multiple tasks from demonstrations where demonstrators perform multiple tasks concurrently.
- Build new environments based on MetaWorld-v2 and create a keyboard interface for user-friendly demonstration collection.
- Propose an EM-based neural network algorithm that treats the problem as a mixture of conditional gaussians, which can successfully learn separate tasks from mixture of demonstrations without any additional task labels.

Multi-task Imitation Learning *Stanford CogAI*

Oct 2021 – Mar 2022

- Under the guidance of **Huazhe Xu** and **Ruohan Zhang**, explore how skill discovery using modularization can be used to facilitate better multi-task learning from limited demonstrations.
- Implement a Soft Modularization network in Imitation Learning settings, which outperforms multi-head agents and single-task agents in terms of convergence speed and overall performance.
- Compare and visualize the modularization process, revealing a correspondence between task similarity and routing weights.

MCM-ICM The Interdisciplinary Contest in Modeling

Dec 2020 - Jan 2021

- Propose a representation system that effectively extracts relationships of famous musicians and genres, model their changes over time and how they interact with each other, and summarize our findings into a paper.
- Our Paper received the **Honorable Mention** prize of 2021.

AI algorithms based on artificial synapse *Student Research Training*

Mar 2020 -Sep 2020

- Construct the neural network simulation pipeline written in C/C++, which uses CBRAM model as neurons to build a 2-layer MLP model. Our CBRAM model outperforms previous methods by a margin of 20% in the MNIST classification task.
- The paper “The Origin of High Linearity, On/Off Ratio and State Number of CBRAM for Neuromorphic Computing” is published at IEEE-TED 2021.

ONGOING RESEARCH

Robot Learning from the Internet *Tsinghua IIIS*

Sep 2022 - present

- Aims to leverage the large amount of data from the Internet to facilitate better robot learning using visual imitation learning.
- Collaborators: Kaizhe Hu, Huazhe Xu.

INTERNSHIP

Bing Ads, Deep Learning Intern | Microsoft Explore Intern Program

July 2021 - September 2021

- Ad-creative generation: propose a novel Ad-generation network architecture that cleverly combines BART and CVAE, which can generate Ad-titles from landing-pages in a sequence-to-sequence fashion.
- The proposed network generates Ad-titles that achieve 96% overall high quality labeled by online-users, with significantly improved diversity by 12% of m-bleu score compared to previous methods.
- Strongly recommended by mentor and manager and received a return offer next summer.

SELECTED PROJECTS

- **MIT Online Learning Program – Machine Learning and Data Science:** Build a CycleGAN model for face-aging effects with a GUI, which can add years to a teenager's photo as well as make an elder's face younger.
- **GRE Vocabulary Learner(Qt):** A self-designed app which aids non-native English speakers to memorize GRE vocabulary easier by using the *Ebbinghaus forgetting curve*, as well as authentic contexts selected from GRE tests.
- **Android News App(Android Studio, front-end):** A news app that can run on Android phones, supports random news browsing, keyword and conditional searching, and a user system with history record.
- **Pipeline CPU(Verilog):** A pipeline CPU that implements 29 standard RISC-V instructions, and the RISC-V-P extension, with dynamic branch prediction, cache and VGA support.
- **Pattern Recognition from Limited Data:** Design a contrastive learning strategy for pretraining using 5 pictures, which improves the performance of large models(ViT, MLP-Mixer, ConvMixer) after fine-tuning by a relative 7%.

EXTRACURRICULAR ACTIVITIES

- **2022 Tennis Team of Computer Science Department**
- **Volunteer Actor of the 110th Anniversary Ceremony of Tsinghua University**
- **Female Speaker at Women Think Next 2021, Microsoft** As group A speaker, shares my story of a girl finding her passion in Computer Science and continually pursuing it.
- **Student Association for Science and Technology** Organize and publish articles for the SAST WeChat official press.
- **IOS Club of Tsinghua University** Vice President of Software engineering department.
- **KouMing Communication Platform, co-founder** A nonprofit organization that aims to provide high school students with learning tips, time-management, career choices, and one-on-one instruction, which gained over 10,000 subscribers in one month.
- **Rubik's Cube Club of Tsinghua High School, President** Founded the first club of Rubik's cube in Tsinghua High School. Entered the 2016 Asian Rubik's Cube Championship and won the top 20 in female speed-cubing, with the official personal best of 13.68s (for 3by3 Rubik's Cube).

PROGRAMMING SKILLS

- **Programming Languages:** C/C++, Python, Java, R, Latex, Markdown, Shell, HTML/CSS, MATLAB, Assembly(RISC-V, x86)
- **Developer Tools:** VS Code, PyCharm, Git, Docker, Linux, Xcode, Unity Hub, Vim, Android Studio, Vivado, Quartus
- **Libraries/Frameworks:** PyTorch, Fairseq, Pandas, NumPy, Matplotlib, Jupyter Notebook, Scikit, Keras, Django, Vue, CUDA, OpenMP, MPI

AWARDS

- Sports Excellence Award, Tsinghua University, 2022.
- Volunteer Excellence Award, Tsinghua University, 2021.
- Science and Innovation Award, Tsinghua University, 2021.
- Top 10 final speakers at Tsinghua English Speech Competition, 2019.

MISCELLANEOUS

- A huge fan of boarding exercises including: **skateboarding, snowboarding, and surfing.**
- Own up to 10 customized mechanical keyboards.