

Liu, Yuezhang

Department of Neuroscience
University of Texas at Austin
E-mail: lyz@utexas.edu
Website: <http://liuyuezhang.com>

My research interests lie in computational neuroscience and reinforcement learning. Currently, I am interested in (i) **representation:** principles of unsupervised representation learning in visual/navigation systems; (ii) **memory & reasoning:** organizing the representations as a knowledge graph and reasoning; (iii) **learning:** insights from biological neural networks, e.g., models of the cerebellum.

EDUCATION

University of Texas at Austin Doctor of Philosophy in Neuroscience	<i>2021 - Present</i>
Hong Kong University of Science and Technology Master of Philosophy in Computer Science	<i>2019 - 2021</i>
Tsinghua University Bachelor of Engineering in Automation	<i>2015 - 2019</i>

RESEARCH EXPERIENCE

Grid Cells and Recurrent Neural Networks <i>Supervisor: Xue-Xin Wei, University of Texas at Austin</i>	Jun 2020 - Present <i>Austin, TX</i>
<ul style="list-style-type: none">· Worked on the RNN and CANN models of grid pattern formation.· Examined the error correction mechanism revealed in the models.	
Evaluating Adversarial Robustness in Simulated Cerebellum <i>Supervisor: Bo Li and Qifeng Chen, HKUST</i>	Sep 2019 - Jun 2020 <i>Hong Kong</i>
<ul style="list-style-type: none">· Built the Marr model of the cerebellum with modern deep learning practice.· Evaluated its adversarial robustness on multiple aspects (network width, LTD, and sparse connectivity).	
RL in Sparse Reward Environments with Memory Graph Planning <i>Supervisor: Changshui Zhang, Tsinghua University</i>	Dec 2018 - Jun 2019 <i>Beijing, China</i>
<ul style="list-style-type: none">· Construct an external topological memory (memory graph planning) for goal-conditioned DQN.· Solved Montezuma's Revenge with high sample efficiency (2500+ points in less than 3M timesteps).	
Visual Attention and Deep Reinforcement Learning <i>Supervisor: Dana H. Ballard, University of Texas at Austin</i>	Jul 2018 - Sep 2018 <i>Austin, Texas</i>
<ul style="list-style-type: none">· Combined human visual selective attention model with A2C agent in Atari games.· Visualized the deep RL agent behaviors in detail.	
Humanoid Kicking Trajectory Planning, RoboCup 2017 <i>Supervisor: Mingguo Zhao, Tsinghua University</i>	Jun 2017 - Aug 2017 <i>Nagoya, Japan</i>
<ul style="list-style-type: none">· Planned kicking trajectories of an adult size humanoid (1.4m) with cubic spline and inverse dynamics.· My work (high kick) helped our team win 2nd place in the Technical Challenge.	

PUBLICATIONS

Workshop and Technical Reports

2. **Liu Yuezhang**, Bo Li, Qifeng Chen. *Evaluating adversarial robustness in simulated cerebellum*. NeurIPS Preregistration Workshop. 2020.
1. **Liu Yuezhang**, Ruohan Zhang, Dana H. Ballard. *An initial attempt of combining visual selective attention with deep reinforcement learning*. arXiv preprint arXiv:1811.04407. 2018.

Theses

2. **Liu Yuezhang**. *Bridging Attractor and Recurrent Neural Networks in Grid Pattern Formation*. M.Phil. Thesis, Hong Kong University of Science and Technology. 2021.
1. **Liu Yuezhang**. *Solving sparse reward problems in reinforcement learning with memory graph planning*. B.Eng. Thesis, Tsinghua University. 2019.

ACADEMIC SERVICE

Reinforcement Learning: An Introduction (Chinese Version) 2018
Student Proofreader (Supervisor: Kai Yu, Shanghai Jiao Tong University)

- Proofread the Chinese translation of Chapters 5, 6, 7, 8, 12, and 13.

TEACHING

COMP 2011, Programming with C++, TA, HKUST Fall, 2020
COMP 2012, Object-Oriented Programming and Data Structures, TA, HKUST Spring 2020

AWARDS AND HONORS

Joseph Needham Merit Scholarship 2021
Tsinghua University Scholarship of Academic Excellence 2016, 2017

COURSEWORK

PHYS 5310, Statistical Mechanics, HKUST Spring 2021
PHYS 5110, Mathematical Methods in Physics, HKUST Fall 2020
COMP 5712, Combinatorial Optimization, HKUST Spring 2020
MATH 6380R, Theoretical Neuroscience, HKUST Fall 2019
System and Computational Neuroscience, Tsinghua Spring 2018
Reinforcement Learning, UCL (Online) Fall 2017

SKILLS

Python, C/C++, Matlab, Chainer, PyTorch, TensorFlow, Git, \TeX

ACTIVITIES

Tsinghua Mountaineering Team (Chola Mountains) 2016
I enjoy ice/rock climbing, trekking, and various outdoor sports in my spare time.