

QIUSHI (MAX) LIN

<https://qiushi-lin.github.io>

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RESEARCH INTERESTS

Developing theoretically principled machine learning algorithms, with a focus on reinforcement learning, online learning, and bandits

EDUCATION

Simon Fraser University (SFU), Burnaby, Canada
M.Sc. in Computing Science (Thesis-Based Program)

2021 - 2023

GPA: 4.06/4.33

- Advisor: Hang Ma
- Courses:
 - CMPT 983: Theoretical Foundations of Reinforcement Learning [ongoing]
 - CMPT 981: Optimization for Machine Learning [A]
 - CMPT 727: Statistical Machine Learning [A]
 - CMPT 983: Graph Representation Learning [A]
 - CMPT 827: Intelligent Systems [A+]
 - CMPT 741: Data Mining [A]
- Thesis: Learning Cooperation for Partially Observable Multi-Agent Path Finding [pdf][slides]
- Committee: Oliver Schulte, Xue Bin Peng

Southern University of Science and Technology (SUSTech), Shenzhen, China
B.Eng. in Computer Science and Technology

2016 - 2020

GPA: 3.75/4.00

- Departmental Highest Honors of Graduation

RESEARCH EXPERIENCES

Research Assistant, AIRob Lab (SFU Robotics Research Group)

09/2021- 12/2023

- supervised by Prof. Hang Ma
- focusing on reinforcement learning and multi-agent systems

Summer Research Program, Illinois Institute of Technology

07/2019

- supervised by Prof. Xin Chen from Northwestern University
- focusing on semantic segmentation of 3D point clouds for LiDAR sensor data

PROJECTS

Convergence Rates of Log-Linear Policy Gradient Methods

09/2023- 12/2023

- provide a general framework to analyze policy gradient in log-linear policy class by reducing the problem to tabular softmax settings
- extend theoretical guarantees from softmax (natural) policy gradients to linear function approximation

A Survey of Apprenticeship Learning

09/2022- 12/2022

- review literature for most widely used methods on apprenticeship learning
- empirically evaluate them methods in the shared benchmarks

Moving Decentralized Agents in Formation

02/2023- 09/2023

- propose a bi-objective multi-agent reinforcement learning framework
- theoretically and empirically evaluate the approach on solving the tasks of formation control and path planning

Partially Observable Multi-Agent Path Finding

02/2023- 05/2022

- propose multi-agent actor-critic framework that utilizes attention mechanisms the heuristics
- empirically evaluate the proposed method over various instances in different environments

Semantic Segmentation of LiDAR Perception Data

07/2019

- process LiDAR perception data of roadways via traditional computer vision methods
- achieve semantic object segmentation on 3D point clouds to identify lanes, poles, barriers, etc.

PUBLICATIONS, PREPRINTS, AND REPORTS

Publications

- **SACHA: Soft Actor-Critic with Heuristic-Based Attention for Partially Observable Multi-Agent Path Finding**

Qiushi Lin and Hang Ma.

In IEEE Robotics and Automation Letters (RA-L) 2023 [pdf] [code]

Preprints

- **Mean Field Control with Envelope Q-learning for Moving Agents in Formation**

Qiushi Lin and Hang Ma.

Preprint (Under Review) [pdf] [code]

Reports

- **On the Convergence Rates of Log-Linear Policy Gradient Methods** [pdf]

(by alphabetic order) Matin Aghaei, Anderson de Andrade, Qiushi Lin.

- **A Survey of Apprenticeship Learning** [pdf]

(by alphabetic order) Ziqian Bai, Minh Bui, Qiushi Lin, Jiaqi Tan.

AWARDS AND HONORS

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|--|------|
| • Westak International Sales, Inc. Graduate Scholarship, SFU | 2023 |
| • Departmental Highest Honors of Graduation, SUSTech | 2020 |

TEACHING EXPERIENCES

Teaching Assistant, SFU

- MACM 101: Discrete Mathematics
- CMPT 310: Introduction to Artificial Intelligence
- CMPT 417/827: Intelligent Systems

TECHNICAL SKILLS

Programming Languages: Python, C/C++, Matlab, SQL

Frameworks and Tools: Pytorch, Tensorflow, Linux, GitHub, LaTeX