QIUSHI (MAX) LIN

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RESEARCH INTERESTS

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

EDUCATION

Simon Fraser University (SFU), Burnaby, Canada *2021 - 2023*
M.Sc. in Computing Science (Thesis-Based Program) GPA: 4.06/4.33

- Advisor: Hang Ma
- Course: [transcript]
  - 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 (Jason) Peng

Southern University of Science and Technology (SUSTech), Shenzhen, China *2016 - 2020*
B.Eng. in Computer Science and Technology 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 derive convergence rates of policy gradient methods for log-linear policy class by reducing the problem to the one in tabular softmax settings
- extend theoretical guarantees of softmax policy gradient methods to derive theoretically guaranteed algorithms for log-linear policies for both exact and inexact policy evaluation
- empirically evaluate the proposed algorithms and compare them to standard policy gradient methods

A Survey of Apprenticeship Learning *09/2022- 12/2022*

- review literature for a few widely used apprenticeship learning algorithms
- empirically evaluate these methods on a shared benchmark

Moving Decentralized Agents in Formation *02/2023- 09/2023*

- propose a bi-objective multi-agent reinforcement learning framework to solve the tasks of formation control and path planning in multi-agent systems
- theoretically analyze the effectiveness of the proposed method; empirically evaluate its performance and compare it to other centralized baselines

Partially Observable Multi-Agent Path Finding *02/2023- 05/2022*

- propose a multi-agent actor-critic framework that utilizes the heuristic-based attention mechanisms
- 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 Decentralized Agents in Formation**
  Qiushi Lin and Hang Ma.
  Preprint (In Submission) [pdf] [code]

Reports
(* = equal contribution)

- **On the Convergence Rates of Log-Linear Policy Gradient Methods** [pdf] [code]
  Qiushi Lin*, Matin Aghaei*, Anderson de Andrade*, Sharan Vaswani.

- **A Survey of Apprenticeship Learning** [pdf]
  Qiushi Lin*, Ziqian Bai*, Minh Bui*, Jiaqi Tan*.

AWARDS AND HONORS

- 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