TIANYU LI

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RESEARCH INTERESTS

Sequence Modeling, Large Language Models, Reinforcement Learning, State Space Models, Multi-linear Algebra

EDUCATION

McGill University/Quebec AI Institute (MILA), Canada   *September 2017 - May 2023*
Ph.D. in Computer Science
Thesis: Towards Efficient State Representations for Sequential Modelling with State Space Models
Advisors: Doina Precup, Guillaume Rabusseau   **GPA: 4.0/4.0**

McGill University, Canada   *September 2015 - June 2017*
Master in Computer Science
Thesis: A Neural Network Based Nonlinear Weighted Finite Automata
Advisor: Doina Precup   **GPA: 3.77/4.0**

Xiamen University, China   *September 2010 - June 2014*
Bachelor in Computer Science
Minor in Statistics
Advisor: Zhonggui Chen   **GPA: 3.7/4.0**

WORKING EXPERIENCE

Senior Research Scientist @ Samsung AI Center Montreal   *June, 2023 - Present*
Supervisors: Gregory Dudek, Steve Liu, Di Wu
Research topic: Applications and optimizations for large language models

– Developed an internal LLM assistant for workflow optmization using Langchain and Streamlit.
– Include features like RAG-based question and answering, summarization, email writing, IT support solution generation etc.
– Led research work on LLM hallucination detection and mitigation. Improved the factuality of the generated content of various open-source LLMs.

Research Intern @ Samsung AI Center Montreal   *April, 2021 - January, 2022*
Supervisor: Di Wu
Research topic: Reinforcement learning for 5G telecommunication

– Proposed and conducted research on MBAIL, utilizing policy distillation and sample transfer to improve the data efficiency of batch RL methods.
– Participated in the research of 5G load balancing, leveraging proximal policy optimization (PPO) under a multitask RL setup.
– Contributed to the testing of MERLIN: the Montreal Environment for Reinforcement Learning and Intelligent Networks.

Research Intern @ Microsoft Research Montreal   *January, 2021 - April, 2021*
Supervisors: Kaheer Suleman, Goeff Gordon
Research topic: Microsoft Office Online user behaviors collection and modeling via imitation learning

– Proposed and refined the project scope and ideas.

- Developed a JavaScript-based Chrome extension for collecting user behaviors data in Office Online.
- Prepared and conducted data collection on UHRS: a Microsoft internal crowd sourcing platform.
- Conducted literature review on web behavior modeling.

PUBLICATIONS

Bogdan Mazoure*, Thang Doan*, **Tianyu Li**, Vladimir Makarenkov, Joelle Pineau, Doina Precup, Guillaume Rabusseau
Low-Rank Representation of Reinforcement Learning Policies
In *Journal of Artificial Intelligence Research, 2022*

Jimmy Li, Di Wu, Yitian Xu, **Tianyu Li**, Seowoo Jang, Xue Liu, and Gregory Dudek
Traffic Scenario Clustering and Load Balancing with Distilled Reinforcement Learning Policies
In *IEEE International Conference on Communications (ICC), 2022*

Tianyu Li, Bogdan Mazoure, and Guillaume Rabusseau
Sequential Density Estimation via Nonlinear Continuous Weighted Finite Automata
In *LearnAut Workshop at The 49th EATCS International Colloquium on Automata, Languages and Programming (ICALP), 2022*

Tianyu Li, Doina Precup, and Guillaume Rabusseau
Connecting Weighted Automata, Tensor Networks and Recurrent Neural Networks through Spectral Learning
In *Machine Learning Journal, 2022*

Di Wu*, **Tianyu Li***, David Meger, Michael Jenkin, Steve Liu, and Gregory Dudek
MBAIL: Multi-Batch Best Action Imitation Learning utilizing Sample Transfer and Policy Distillation
In *Offline Reinforcement Learning Workshop at The 35th Conference on Neural Information Processing Systems (Neurips), 2021*

Tianyu Li*, Bogdan Mazoure*, Doina Precup, and Guillaume Rabusseau
Efficient Planning under Partial Observability with Unnormalized Q Functions and Spectral Learning
In *The 23rd International Conference on Artificial Intelligence and Statistics (AISTATs), 2020*

Guillaume Rabusseau, **Tianyu Li**, and Doina Precup
Connecting Weighted Automata and Recurrent Neural Networks through Spectral Learning
In *The 22nd International Conference on Artificial Intelligence and Statistics (AISTATs), 2019*

Tianyu Li, Guillaume Rabusseau, and Doina Precup
Nonlinear Weighted Finite Automata
In *The 21st International Conference on Artificial Intelligence and Statistics (AISTATs), 2018*

Tianyu Li, Guillaume Rabusseau, and Doina Precup
Neural Network based Nonlinear Weighted Finite Automata
In *ACM/IEEE Symposium on Logic in Computer Science (LICS)* workshop on Learning and Automata, 2017

TECHNICAL REPORTS

Junliang Luo, **Tianyu Li**, Di Wu, Michael Jenkin, Steve Liu, Gregory Dudek
Hallucination Detection and Mitigation: an Investigation   *December, 2023*

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* Equal Contribution

TEACHING EXPERIENCE

Teaching Assistant @ African Institute for Mathematical Sciences (AIMS):
Matrix Factorization and Tensor Methods *May, 2020*

Teaching Assistant @ McGill:
COMP 189 Computers and Society   COMP 202 Foundations of Programming
COMP 360 Algorithm Design   COMP 424 Artificial Intelligence
COMP 551 Applied Machine Learning   COMP 652 Machine Learning

COMMUNITY SERVICE

Program Committee:
The 16th International Conference on Grammatical Inference (ICGI) *July 2023*

Conference Reviewer:
Neurips, ICLR, AISTATs, ICML, etc.

Graduate Student Admission Committee:
MILA Quebec AI Institute *December 2020 and December, 2022*

SKILLS

Programming languages:

- Extensive experience with: Python, PyTorch, Langchain, Streamlit, LATEX, and JavaScript;

- Moderate experience with: TensorFlow, R, Java, C++, and Matlab;

Languages: English, Mandarin
Hobbies: Cooking, Kickboxing