ANDREW LI

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🪪	Citizenship	Canada 🍁

RESEARCH DIRECTION

My current research focuses on the intersection of **machine learning** (particularly **deep reinforcement learning**) and **symbolic reasoning** with the goal of building more reliable and transparent AI agents. My research to date covers the following topics:

* Formal logics as a zero-shot specification language for RL. (**C4, C6**)
* Formal languages in RL under uncertain semantic interpretations. (**C8**)
* Learning belief state representations from high-dimensional data for partially observable RL. (**C7**)
* Learning automata representations from high-dimensional data for classification. (**C3, W1**)
* Learning Bayesian networks from data. (**C1**)

SKILLS

Software Engineering: Through multiple internships at top technology companies, I gained extensive experience in software development and algorithm design. I was previously recognized as one of Canada's leading competitors in informatics competitions.

Machine Learning: I have over 5 years of academic experience publishing in top ML venues and training ML models in frameworks such as PyTorch, TensorFlow, and, Theano.

Reinforcement Learning: I have real-world industry experience training large-scale RL models for autonomous driving, in addition to years of academic experience developing RL algorithms. I am familiar with modern RL best practices, including multi-process and GPU computing, and JAX optimization.

EDUCATION

University of Toronto   *2021 - 2025 (anticipated)*
Candidate for *PhD* in Computer Science
Advisor: Sheila A. McIlraith
(GPA: 3.96/4.0)

University of Toronto   *2019 - 2021*
MSc in Computer Science
Advisor: Sheila A. McIlraith
(GPA: 4.0/4.0)

University of Waterloo   *2015 - 2019*
BMath in Computer Science and Combinatorics & Optimization (Double Major)
(GPA: 94.5/100)

CONFERENCE PUBLICATIONS (REFEREED)

(*) denotes equal first-author contribution.

C8 **Andrew C. Li**, Zizhao Chen, Toryn Q. Klassen, Pashootan Vaezipoor, Rodrigo Toro Icarte, Sheila A. McIlraith. *Reward Machines for Deep RL in Noisy and Uncertain Environments.* 38th Conference on Neural Information Processing Systems (**NeurIPS**). Vancouver, British Columbia Canada, December 2024.

C7 Andrew Wang*, **Andrew C. Li***, Rodrigo Toro Icarte, Toryn Q. Klassen, Sheila A. McIlraith. *Learning Belief Representations for Partially Observable Deep RL*. 40th International Conference on Machine Learning (**ICML**). Honolulu, Hawaii USA, July 2023.

C6 Mathieu Tuli, **Andrew C. Li**, Pashootan Vaezipoor, Toryn Q. Klassen, Scott Sanner, Sheila A. McIlraith. *Learning to Follow Instructions in Text-based Games*. 36th Conference on Neural Information Processing Systems (**NeurIPS**). New Orleans, Louisiana USA, November 2022.

C5 Pashootan Vaezipoor*, **Andrew C. Li***, Rodrigo Toro Icarte, Sheila A. McIlraith. *Achieving Zero-Shot Task Generalization with Formal Language Instructions*. 5th Multi-disciplinary Conference on Reinforcement Learning and Decision Making (**RLDM**). Providence, Rhode Island USA, June 2022.

C4 Pashootan Vaezipoor*, **Andrew C. Li***, Rodrigo Toro Icarte, Sheila A. McIlraith. *LTL2Action: Generalizing LTL Instructions for Multi-Task RL*. 38th International Conference on Machine Learning (**ICML**). Virtual conference, July 2021.

C3 Maayan Shvo, **Andrew C. Li**, Rodrigo Toro Icarte, Sheila A. McIlraith. *Interpretable Sequence Classification via Discrete Optimization.* 35th AAAI Conference on Artificial Intelligence (**AAAI**). Virtual conference, Feb. 2021.

C2 Neda Paryab, Alexander Sachs, **Andrew Li**, Meiyappan Nagappan and Jesse Hoey. *Relating Values and Social Network Structure*. 5th International Conference on Computational Social Science (**IC2S2**). Amsterdam, The Netherlands, July 2019.

C1 **Andrew C. Li** and Peter van Beek. *Bayesian Network Structure Learning with Side Constraints*. 9th International Conference on Probabilistic Graphical Models (**PGM**). Prague, Czech Republic, Sept. 2018.

WORKSHOP PRESENTATIONS (REFEREED)

(*) denotes equal first-author contribution.

W8 **Andrew C. Li**, Zizhao Chen, Toryn Q. Klassen, Pashootan Vaezipoor, Rodrigo Toro Icarte, Sheila A. McIlraith. *Reward Machines for Deep RL in Noisy and Uncertain Environments.* Robotic Tasks and How to Specify Them? — Task Specification for General-Purpose Intelligent Robots, at RSS. Delft, Netherlands, July 2024.

W7 Pashootan Vaezipoor*, **Andrew C. Li***, Rodrigo Toro Icarte, Sheila A. McIlraith. *LTL2Action: Generalizing LTL Instructions for Multi-Task RL*. AAAI Symposium Series (On the Effectiveness of Temporal Logics on Finite Traces in AI). San Francisco, California USA, March 2023. **Best Poster Award**.

W6 Mathieu Tuli, **Andrew C. Li**, Pashootan Vaezipoor, Toryn Q. Klassen, Scott Sanner, Sheila A. McIlraith. *Learning to Follow Instructions in Text-based Games*. AAAI Symposium Series (On the Effectiveness of Temporal Logics on Finite Traces in AI). San Francisco, California USA, March 2023.

W5 **Andrew C. Li***, Zizhao Chen*, Pashootan Vaezipoor, Toryn Q. Klassen, Rodrigo Toro Icarte, Sheila A. McIlraith. *Noisy Symbolic Abstractions for Deep RL: A case study with Reward Machines*. Deep Reinforcement Learning Workshop, at NeurIPS. New Orleans, Louisiana USA, November 2022.

W4 **Andrew C. Li**, Pashootan Vaezipoor, Rodrigo Toro Icarte, Sheila A. McIlraith. *Exploring Long-Horizon Reasoning with Deep RL in Combinatorially Hard Tasks*. Decision Awareness in Reinforcement Learning Workshop, at ICML. Baltimore, Maryland USA, July 2022.

W3 Mathieu Tuli, **Andrew C. Li**, Pashootan Vaezipoor, Toryn Q. Klassen, Scott Sanner, Sheila A. McIlraith. *Instruction Following in Text-Based Games*. 3rd Wordplay: When Language Meets Games Workshop, at NAACL. Seattle, Washington USA, July 2022.

W2 Maayan Shvo, **Andrew C. Li**, Rodrigo Toro Icarte, Sheila A. McIlraith. *Interpretable Sequence Classification via Discrete Optimization (Abridged Report)*. 4th Knowledge Representation and Reasoning Meets Machine Learning Workshop (KR2ML 2020), at NeurIPS. Virtual workshop, Dec. 2020.

W1 Phillip J.K. Christofferson, **Andrew C. Li**, Rodrigo Toro Icarte, Sheila A. McIlraith. *Learning Symbolic Representations for Reinforcement Learning of Non-Markovian Behavior*. 4th Knowledge Representation and Reasoning Meets Machine Learning Workshop (KR2ML 2020), at NeurIPS. Virtual workshop, Dec. 2020.

WORK EXPERIENCE

Planning and Control PhD Intern <div align="right">Zoox Inc.</div>
Foster City, California <div align="right">*Summer 2023*</div>

Developed reinforcement learning algorithms for autonomous vehicle control and closed-loop metrics for their evaluation.

Teaching Assistant <div align="right">University of Toronto</div>
Toronto, Ontario

* CSC236 - Introduction to Theory of Computation	*Fall 2022*
* CSC2515 - Introduction to Machine Learning	*Fall 2021*
* CSC236 - Introduction to Theory of Computation	*Fall 2020*
* CSC373 - Algorithm Design, Analysis & Complexity	*Winter 2020*
* CSC236 - Introduction to Theory of Computation	*Fall 2019*

Undergraduate Researcher <div align="right">University of Waterloo</div>
Waterloo, Ontario

* Supervisor: Jesse Hoey	*Fall 2018*
* Supervisor: Peter van Beek	*Winter 2018*
* Supervisor: Justin Wan	*Fall 2017*

Software Engineering Intern <div align="right">Square Inc.</div>
San Francisco, California <div align="right">*Winter 2017*</div>

Improved growth of the Appointments iOS user base by building a referrals feature in Swift and Objective-C. Reduced UI test running time by 10x by refactoring test infrastructure. Migrated large sections of the code base to Swift 3, supporting new releases of iOS.

Software Engineering Intern <div align="right">Square Inc.</div>
San Francisco, California <div align="right">*Summer 2016*</div>

Improved user experience and increased revenue by building a Ruby-on-Rails feature enabling purchases directly in user onboarding. Added backend support to process credit card transactions without compromising sensitive user info. Condensed onboarding flow, generating a 5% absolute lift in new sign-ups, verified through A/B testing.

PROFESSIONAL SERVICE

Reviewing

* NeurIPS 2022 **(Top 8% Reviewer)**, 2024
* ICML 2023
* ICLR 2022
* ML4OR Workshop at AAAI 2022
* TaskSpec Workshop at RSS 2024.

Mentorship

* Andrew Wang (Undergraduate) — *Summer 2022 - Winter 2023*
* Zoe Chen (Undergraduate) — *Summer 2022*
* Phillip Christofferson (Undergraduate) — *Winter 2020 - Fall 2020*

SCHOLARSHIPS AND AWARDS

* Ontario Graduate Scholarship ($15,000) — *Jan 2025*
* NSERC CGS-D ($105,000) — *2021-2024*
* NSERC CGS-M ($17,500) — *Sept. 2020*
* Vector Scholarship in Artificial Intelligence ($17,500) — *Sept. 2019*
* NSERC Undergraduate Research Award ($4,500) — *Jan. 2018*
* President's International Experience Award ($1,500) — *Jan. 2017*
* W.T. Tutte National Scholarship ($20,000) — *Sept. 2015*
  · Second largest of 15 national scholarships awarded to exceptional first-year math students.
* President's Scholarship of Distinction — *Sept. 2015*
* Canadian Computing Olympiad — *May 2014, 2015*
  · Invitational national-level algorithms competition for top 20 high school students in Canada.
  · *Bronze medal* (2014).
  · *Silver medal* (2015). 1st (out of 1472) in Canada on the qualifying round, 6th in Canada on the final round.