Eric Graves

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RESEARCH INTERESTS

My research interests centre on **Reinforcement Learning (RL)** as a general tool to achieve superhuman algorithmic performance in a wide variety of domains. Recently I have focused on **off-policy learning** as a way to expand the range of possible applications of RL, and **policy gradient algorithms** as an approach to improving algorithmic performance beyond human capabilities.

EDUCATION

University of Alberta — *Doctor of Philosophy (in Progress)* May 2017 - present

Supervisor: Professor Richard S. Sutton.

University of Alberta — *Master of Science (converted to PhD)* September 2015 - April 2017

Supervisor: Professor Richard S. Sutton.

University of Alberta — *Bachelor of Science, Specialization in Computing Science* September 2008 - June 2012

Completed industrial internship on a research project to automatically generate code using graph algorithms. Varsity Track and Field athlete, competed in the high jump.

PUBLICATIONS

Conferences

Imani E*, **Graves E***, White M (2018): An Off-Policy Policy Gradient Theorem using Emphatic Weightings. In Proceedings of the Conference on Neural Information Processing Systems (NeurIPS). ***Joint first author.**

Schenk K, Lari A, Church M, **Graves E**, Duncan J, Miller R, Desai N, Zhao R, Szafron D, Carbonaro M, Schaeffer J (2013): ScriptEase II: Platform Independent Story Creation Using High-Level Patterns. AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE).

Church M, **Graves E**, Duncan J, Lari A, Miller R, Desai N, Zhao R, Carbonaro M, Schaeffer J, Sturtevant NR, Szafron D (2011): A Demonstration of ScriptEase II. AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE).

SERVICE AND OUTREACH

Conference Reviewer

- Neural Information Processing Systems (NeurIPS) 2019 - present
- International Conference on Machine Learning (ICML) 2019 - present
- International Conference on Learning Representations (ICLR) 2019 - present

HONOURS AND AWARDS

NeurIPS top 10% of reviewers 2020

Top 10% highest average area chair ratings out of 7062 reviewers.

NeurIPS top 50% of reviewers 2019

Top 50% highest average area chair ratings out of 4737 reviewers.

Queen Elizabeth II Graduate Scholarship September 2016

Awarded for outstanding academic achievement in a graduate program in Alberta.

Jimmie Condon Scholarship January 2010

Awarded for athletic and academic excellence in a post-secondary program in Alberta.

RESEARCH EXPERIENCE

University of Alberta — *Research Assistant* May 2016 - present

- Assisted Professor Richard S. Sutton in preparing chapter 13 (Policy Gradient Methods) of the textbook *Reinforcement Learning: An Introduction, 2nd Edition.*
- Designed, programmed, and executed experiments to investigate and illustrate strengths and weaknesses of policy-based and value-based learning algorithms. Experiments written in Python.
- Empirically investigated the equivalence of soft Q-learning and actor-critic algorithms in the entropy-regularized reinforcement learning setting for a course project. Results showed that while the two algorithms are equivalent in expectation, they possess different variance properties, resulting in different empirical performance.
- Compared unsupervised sparse representation learning techniques on MNIST, including sparse autoencoders and sparse dictionary learning. Experiments were implemented in Python using TensorFlow.

TEACHING EXPERIENCE

University of Alberta — *Teaching Assistant* January 2016 - present

- Helped plan lectures, led in-class group discussions, helped students during office hours, and marked research projects for CMPUT 609: Reinforcement Learning II.
- Assisted in the creation of assignments, held office hours, and marked essays, presentations, and projects for the undergraduate course in ethics and technology, CMPUT 300: Computers and Society.
- Volunteered as a playtester and mentor for INTD 350: Game Design Principles and Practices.

INDUSTRY EXPERIENCE

Gamesys Canada (Edmonton, AB) — *Software Developer*

Game Studio Team July 2014 - October 2015

- Worked in a multi-disciplinary team to create innovative online games, using a variety of technologies.
- Created novel algorithms to procedurally generate balanced, completable game levels using graph theory.
- Optimized functions and fixed bugs in the in-house programming language translation engine.

Poker Information Team July 2012 - July 2014

- Built systems that enforce game integrity for one of the first legal online poker offerings in New Jersey.
- Created a system to automatically detect and prevent fraud during gameplay in real time which led to an United States patent application.

University of Alberta — *Video Game Tools Developer* January 2010 - April 2011

- Designed, implemented, debugged, refactored, and documented a large portion of the ScriptEase 2 Tool, which uses a novel user interface to automatically generate code for arbitrary video game engines, allowing non-technical designers to quickly and easily script complex logic without writing code.

PATENT APPLICATIONS

Graves E, et al., inventors; Gamesys Ltd., assignee. Systems and Methods for Detection and Management of Fraudulent or Collusive Poker Game Play. United States patent application US 20,160,071,369. 2016 Mar 10.