

Richard Gibson

Interests and Expertise

Artificial Intelligence and Games. In particular, AI in video games, game theory, game-playing programs, sports analytics, and machine learning.

Education

Ph.D. Computing Science, University of Alberta, 2014.

Studied artificial intelligence and game theory, applied research in building champion poker-playing programs.
Co-authored 8 refereed papers published in top tier AI conferences.

M.Sc. Mathematics, Simon Fraser University, 2009.

Studied combinatorics and coding theory, specifically looking at existence patterns of sequences commonly implemented in digital signalling applications.
Co-authored 2 refereed journal papers in a top level coding journal.

B.Sc. Honours in Mathematics, University of Victoria, 2006.

Co-authored 5 refereed journal papers in the areas of graph theory and mathematical biology.

Employment

Poker AI Programmer and Consultant. Robot Shark Gaming / Self-employed, 2014-2016.

Skills utilized: C/C++/Python, AWS S3/ec2, high performance computing, Git, machine learning, Linux.

Animation Engineer. Propaganda Games, Disney Interactive Studios, 2007-2008.

Skills utilized: C++, Havok animation library, Perforce, gameplay engineering.

Additional Projects

PB Tracker - A web application for tracking and sharing video game accomplishments.

Skills utilized: Python/HTML5/CSS/Javascript/jQuery, Google App Engine, responsive web design.

Automated Sports Scheduling - A C++ library for efficiently generating sports schedules.

Skills utilized: C++, graph algorithms, Git.

Awards and Honours

Computing Science Outstanding Ph.D. Thesis Award. Runner-up, Spring 2014.

Alberta Innovates – Technology Futures Graduate Student Scholarship. \$36,000 per annum, 2011-2013.

AAAI Computer Poker Competition Champion. Headed University of Alberta's three-player entries that won 6 out of 7 events from 2010-2013.

AIIDE Best Conference Reviewer Award. Team effort with Duane Szafron and students, 2011.

NSERC Alexander Graham Bell Canada Graduate Scholarship (Ph.D.). \$35,000 per annum, 2009-2010.

Super Mario event of the Reinforcement Learning Competition. Runner-up, 2009.

NSERC Alexander Graham Bell Canada Graduate Scholarship (Master's). \$17,500 per annum, 2006-2008.

Governor General's Silver Medal. Awarded for top academic standing in the Faculty of Science among graduating class at the University of Victoria, 2006.

Society Memberships

Computing Science Graduate Students' Association. Publicity Director, 2010-2011.

Publications

Computer Science Refereed Conferences

Duane Szafron, Richard Gibson, and Nathan Sturtevant. A parameterized family of equilibrium profiles for three-player Kuhn poker. *Proceedings of the Twelfth International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, pp. 247-254, 2013 [Acceptance Rate: 23%].

Richard Gibson, Marc Lanctot, Neil Burch, and Duane Szafron. Efficient Monte Carlo counterfactual regret minimization in games with many player actions. *Advances in Neural Information Processing Systems 25 (NIPS)*, pp. 1889-1897, 2012 [Acceptance Rate: 25%].

Marc Lanctot, Richard Gibson, Neil Burch, Martin Zinkevich, and Michael Bowling. No-regret learning in extensive-form games with imperfect recall. *Proceedings of the Twenty-Ninth International Conference on Machine Learning (ICML)*, pp. 65-72, 2012 [Acceptance Rate: 27%].

Richard Gibson, Marc Lanctot, Neil Burch, Duane Szafron, and Michael Bowling. Generalized sampling and variance in counterfactual regret minimization. *Proceedings of the Twenty-Sixth Conference on Artificial Intelligence (AAAI)*, pp. 1355-1361, 2012 [Acceptance Rate: 26%].

Michael Johanson, Nolan Bard, Marc Lanctot, Richard Gibson, and Michael Bowling. Efficient Nash equilibrium approximation through Monte Carlo counterfactual regret minimization. *Proceedings of the Eleventh International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 8 pages, 2012 [Acceptance Rate: 20%].

Richard G. Gibson and Duane Szafron. On strategy stitching in large extensive form multiplayer games. *Advances in Neural Information Processing Systems 24 (NIPS)*, pp. 100-108, 2011 [Acceptance Rate: 22%].

Richard Gibson, Neesha Desai, and Richard Zhao. An automated technique for drafting territories in the board game Risk. *Proceedings of the Sixth AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE)*, pp. 15-20, 2010.

Mathematics Journal Articles

Richard G. Gibson and Jonathan Jedwab. Quaternary Golay sequence pairs II: Odd length. *Des. Codes Cryptogr.* **59**, pp. 147–157, 2011.

Richard G. Gibson and Jonathan Jedwab. Quaternary Golay sequence pairs I: Even length. *Des. Codes Cryptogr.* **59**, pp. 131–146, 2011.

Ernest J. Cockayne, Richard G. Gibson, and Christina M. Mynhardt. Claw-free graphs are not universal fixers. *Discrete Math.* **309**(1), pp. 128–133, 2009.

Richard G. Gibson. Bipartite graphs are not universal fixers. *Discrete Math.* **308**(24), pp. 5937–5943, 2008.

Michelle Edwards, Richard G. Gibson, Michael A. Henning, and Christina M. Mynhardt. Diameter of paired domination edge-critical graphs. *Australasian J. Combin.* **40**, pp. 279–292, 2008.

Richard G. Gibson and Christina M. Mynhardt. Counterexample to a conjecture on the structure of bipartite partitionable graphs. *Discussiones Mathematicae Graph Theory* **27**(3), pp. 527–540, 2007.

Roderick Edwards, Richard Gibson, Reinhard Illner, and Vern Paetkau. A stochastic model for circadian rhythms from coupled ultradian oscillators. *Theoretical Biology and Medical Modelling* **4**(1), 2007.

Additional Refereed Contributions

Richard Gibson. Counterfactual regret minimization and domination in extensive-form games. *AAAI Computer Poker Symposium*, July 2012.

Richard Gibson and Duane Szafron. Regret minimization in multiplayer extensive games. *Proceedings of the Twenty-Second International Joint Conference on Artificial Intelligence (IJCAI)*, pp. 2802–2803, 2011 (extended abstract for Doctoral Consortium).

Additional Non-Refereed Contributions

Richard Gibson. Regret minimization in non-zero-sum games with applications to building champion multiplayer computer poker agents. *ArXiv e-prints*, 2013.

Theses

Richard Gibson. Regret minimization in games and the development of champion multiplayer computer poker-playing agents. Ph.D. thesis, University of Alberta, Spring 2014.

Richard Gibson. Quaternary Golay sequence pairs. Master's thesis, Simon Fraser University, 2008.

Presentations

Regret Minimization in Games and the Development of Champion Multiplayer Computer Poker Agents. Ph.D. thesis oral presentation, December 2013.

A Parameterized Family of Equilibrium Profiles for Three-Player Kuhn Poker. AAMAS oral and poster presentation, May 2013.

Recent Advances in Computer Poker and Future Research for Artificial Intelligence in Games. Simon Fraser University - SIAT faculty candidate presentation, February 2013.

Computer Poker Research at the University of Alberta. Honours Seminar presentation, February 2013.

Efficient Monte Carlo Counterfactual Regret Minimization in Games with Many Player Actions. NIPS poster presentation, December 2012.

Generalized Sampling and Variance in Counterfactual Regret Minimization. AAAI lightning oral and poster presentation, July 2012.

Regret Minimization and Domination in Extensive-Form Games. AAAI Computer Poker Symposium oral presentation, July 2012.

Solving Large Extensive-Form Games Quicker. University of Alberta AI Seminar oral presentation, June 2012.

Strategy Stitching in Large Extensive Form Multiplayer Games. NIPS poster presentation, December 2011.

Regret Minimization in Multiplayer Extensive Games. IJCAI Doctoral Consortium oral presentation, July 2011.

Drafting Territories in the Board Game Risk. AIIDE oral presentation, October 2010.

Quaternary Golay Sequence Pairs. Mathematics Graduate Student Conference oral presentation, October 2008.

Service

Paper reviewer for:

International Game Theory Review, 2013.

Utilitas Mathematica, 2013.

Neural Information Processing Systems (NIPS), 2013.

International Joint Conference on Artificial Intelligence (IJCAI), 2013.

ACM Conference on Electronic Commerce (EC), 2012.

AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE), 2011.

Teaching

CMPUT 114: Introduction to Computing Science. Lab instructor and teaching assistant, achieved high class evaluation scores, Fall 2011.

CMPUT 651: Topics in Artificial Intelligence with Applications to Video Games. Presented 3 class lectures, Fall 2009.

Math 447/747: Coding Theory. Presented 1 class lecture, Fall 2006.

Outreach

Research Blogs for IEEE Spectrum. A three-part series about the Annual Computer Poker Competition, 2012.

Volunteering

Little League Baseball Coach. Mentored a team of 8-10 year-olds at Layritz Ballpark, Victoria BC, 2003.

Personal Information

Citizenship: Canada.

Family: Married, two children.

Hobbies: Video games, sports, board games, and building applications that support these hobbies.