Chris J. Maddison

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Education

DPhil, Department of Statistics, University of Oxford Supervisors: Prof. Arnaud Doucet and Prof. Yee Whye Teh	2016–2020
MSc, Department of Computer Science, University of Toronto Supervisor: Prof. Geoffrey Hinton FRS FRSC	2012–2014
BSc, Hons, Department of Computer Science, University of Toronto	2007–2012

Employment

Assistant Professor, Department of Computer Science and Department of Statistical Sciences, University of Toronto	2020–present
Faculty Member, Vector Institute, Toronto, ON	2020–present
Senior Research Scientist, DeepMind, London, UK	2018–present
Member, Institute for Advanced Study, Princeton, NJ	2019-2020
Research Scientist, DeepMind, London, UK	2016–2018
Intern, DeepMind	2014–2015
Intern, Google, Inc., Brain Team	2014
Intern, Microsoft Research	2013
Research Assistant, University of Toronto	2011
Research Assistant, University of California San Diego	2010
Research Assistant, University of British Columbia	2009

Affiliations

Member, ELLIS Society	2020–present
Faculty Affiliate, Schwartz Reisman Institute, Toronto, ON	2020–2021
Junior Fellow – Massey College, Toronto	2012–2015

Awards and Honors

IJCAI Marvin Minsky Medal for Outstanding Achievements in AI (AlphaGo Team)	2018
Best Reviewer Award, Neural Information Processing Systems (NeurIPS)	2017
Best Paper Award, Deep Structured Prediction Workshop ICML	2017
Cannes Lions International Festival of Creativity, Grand Prix (AlphaGo Team)	2016
Outstanding Paper Award, Neural Information Processing Systems (NeurIPS)	2014
The Prince Phillip Silver Medal, University of Toronto	2012
Dean's List Scholar, University of Toronto	2012
Dean's List Scholar, University of Toronto	2011
University of Toronto Scholar, University of Toronto	2011
University of Toronto Scholar, University of Toronto	2010
Ron Wilson Student Achievement Award, University of Toronto	2010
The Dr. John Knowles Colling Memorial Scholarship, University of Toronto	2008

Grants and Fellowships

CIFAR AI Catalyst Grant (co-PI) University of Toronto	2020–2022
Canada CIFAR AI Chair University of Toronto	2020–2025
Open Philanthropy Project AI Fellow University of Oxford	2018–2020
Google DeepMind Scholarship University of Oxford	2016–2020
NSERC Postgraduate Scholarship – Doctoral University of Toronto	2014–2017
NSERC Canada Graduate Scholarship – Masters University of Toronto	2012–2013
NSERC Undergraduate Student Research Award University of Toronto	2011
Milne Research Award University of California San Diego	2010
NSERC Undergraduate Student Research Award University of British Columbia	2009
Canada Millennium Scholarship Foundation's National In-course Excellence Award, University of Toronto	2009

Presentations

Invited Talks

Career & Innovation Hub, Banff International Research Station	(*scheduled*)	November 2020
Guest Lecture, CS Department, Princeton University	(*scheduled*)	November 2020
Google Research, Brain Team, Paris, France		August 2020
Invited Speaker, Retrospectives Workshop, ICML		July 2020
IIIS-Haihua Distinguished Seminar Series in AI, Tsinghua University		December 2019
Postdoc Short Talks, Institute for Advanced Study		October 2019
CS Department, Princeton University		April 2019
CS Department, Courant Institute, New York University		April 2019
CS Department, Carnegie Mellon University		March 2019
Departments of CS, University of Toronto		March 2019
EECS Special Seminar Series, Massachusetts Institute of Technology		March 2019
D-INFK, ETH Zürich		March 2019
Department of CS, Stanford		Feb. 2019
Gatsby Seminar, Gatsby Unit, UCL		Feb. 2019
Statistics Seminar, Department of Statistics, Stanford		Jan. 2019
Computational Statistics Reading Group, UCL Statistics		Jan. 2019
SIERRA, Centre de Recherche INRIA de Paris		Nov. 2018
LIDS, Massachusetts Institute of Technology		Nov. 2018
CSML Colloquium, Princeton University		Nov. 2018
Qualcomm-UvA Seminar, Universiteit van Amsterdam		Sept. 2018
ML Advances and Applications Seminar, The Fields Institute, Toronto		March 2018
Machine Learning Journal Club, Gatsby Unit, University College London		June 2017
Edinburgh Deep Learning Workshop, University of Edinburgh		March 2017
ML @ CUED Seminar, University of Cambridge		Feb. 2015
ML @ CUED Seminar, University of Cambridge		Aug. 2013

Contributed Presentations

NeurIPS Bayesian Deep Learning Workshop, Montreal, Canada	Dec. 2018
ICML Deep Structured Prediction Workshop, Sydney, Australia	Aug. 2017
ICLR Workshop, Toulon, France	April 2017
NeurIPS Bayesian Deep Learning Workshop, Barcelona, Spain	Dec. 2016
NeurIPS Conference Track, Oral, Montreal, Canada	Dec. 2014

Teaching

Instructor, CSC311 - Intro. to Machine Learning, UToronto	2020
Teaching Assistant, CSC321 - Intro. to Neural Networks, UToronto	2014
Teaching Assistant, CSC108 - Intro. to Computer Programming, UToronto	2013
Teaching Assistant, CSC148 - Intro. to Computer Science, UToronto	2012

Mentorship

Direct Supervision

Honghua Dong, PhD UToronto (Principal Supervisor)	2020–present
Yangjun Ruan, PhD UToronto (Principal Supervisor)	2020–present

Dami Choi, PhD UToronto (Co-Supervisor with David Duvenaud) 2020–present
Max Paulus, PhD ETH Zürich (Co-Supervisor with Andreas Krause) 2020–present
Yun Fan Zhou, BASc in EngSci UToronto (Thesis Supervisor) 2020–present

Committee Member
Will Grathwohl, PhD UToronto
Deeksha Adil, PhD UToronto

Academic & Professional Activities

Seminar Service
Lead Organizer, Machine Learning Seminar, Institute for Advanced Study 2019–2020

Committee Service
Member, Postdoc Hiring Committee, Vector Institute 2020–2021
Member, Publicity & Events Committee, Vector Institute 2020–2021
Member, Undergraduate Affairs Committee, Dept. of CS, UToronto 2020–2021
Member, Undergraduate Curriculum Reorg, Dept. of CS, UToronto 2010

Journal Service
Referee, Journal of the American Statistical Association 2020
Referee, Journal of Machine Learning Research 2020
Referee, Foundations and Trends in Machine Learning 2019

Conference Service
Area Chair, International Conference on Learning Representations (ICLR) 2021
Area Chair, Neural Information Processing Systems (NeurIPS) 2020
Area Chair, International Joint Conferences on Artificial Intelligence (IJCAI) 2020
Reviewer, Neural Information Processing Systems (NeurIPS)
Reviewer, International Conference on Machine Learning (ICML)
Reviewer, International Conference on Learning Representations (ICLR)
Reviewer, International Conference on Artificial Intelligence and Statistics (AISTATS)
Reviewer, Uncertainty in Artificial Intelligence (UAI)
Reviewer, Association for the Advancement of Artificial Intelligence (AAAI)

Consulting
iTechLaw White Paper on Ethics for AI 2018–2019

Interviews

"A Recipe for Creativity: In Conversation with Chris Maddison", July 2020
Teatime at Home, The Institute for Advanced Study

"The centre of the AI universe", *CIFAR News* Dec. 2019

"Q&A with Chris Maddison: On unsupervised learning, moments of surprise, and becoming unstuck", *Fall Letter*, The Institute for Advanced Study Nov. 2019

"Google DeepMind's AlphaGo: meet the U of T computer scientists who helped it win", *U of T News* Feb. 2016

Patents

US20180032863A1, United States Filed Sept. 2016
Training a policy neural network and a value neural network
T. Graepel, A. Huang, D. Silver, A. Guez, L. Sifre, I. Sutskever, C. Maddison

US20180032864A1, United States Filed Sept. 2016
Selecting actions to be performed by a reinforcement learning agent using tree search
T. Graepel, A. Huang, D. Silver, A. Guez, L. Sifre, I. Sutskever, C. Maddison

US9928040B2, United States Issued March 2018
Source code generation, completion, checking, correction
D. Tarlow, C. Maddison

Refereed Journal Publications

[1] D. Silver, A. Huang, C. J. Maddison, A. Guez, L. Sifre, G. van den Driessche, J. Schrittwieser, I. Antonoglou, V. Panneershelvam, M. Lanctot, S. Dieleman, D. Grewe, J. Nham, N. Kalchbrenner, I. Sutskever, T. Lillicrap, M. Leach, K. Kavukcuoglu, T. Graepel, and D. Hassabis. Mastering the game of Go with deep neural networks and tree search. *Nature*, 529(7587):484 – 489, 2016.

[2] C. J. Maddison, R. C. Anderson, N. H. Prior, M. D. Taves, and K. K. Soma. Soft song during aggressive interactions: Seasonal changes and endocrine correlates in song sparrows. *Hormones and Behavior*, 62(4):455 – 463, 2012.

[3] S. A. Heimovics, N. H. Prior, C. J. Maddison, and K. K. Soma. Rapid and Widespread Effects of 17-beta-estradiol on Intracellular Signaling in the Male Songbird Brain: A Seasonal Comparison. *Endocrinology*, 153(3):1364–1376, 2012.

Refereed Conference Publications

[1] M. B. Paulus, D. Choi, D. Tarlow, A. Krause, and C. J. Maddison. Gradient Estimation with Stochastic Softmax Tricks. In *Advances in Neural Information Processing Systems 34*, 2020. *to appear*.

[2] G. Lorberbom, C. J. Maddison, N. Heess, T. Hazan, and D. Tarlow. Direct Policy Gradients: Direct Optimization of Policies in Discrete Action Spaces. In *Advances in Neural Information Processing Systems 34*, 2020. *to appear*.

[3] G. Tucker, D. Lawson, S. Gu, and C. J. Maddison. Doubly Reparameterized Gradient Estimators for Monte Carlo Objectives. In *International Conference on Learning Representations*, 2019.

[4] B. O'Donoghue and C. J. Maddison. Hamiltonian descent for composite objectives. In *Advances in Neural Information Processing Systems 33*, 2019.

[5] E. Mathieu, C. Le Lan, C. J. Maddison, R. Tomioka, and Y. Whye Teh. Hierarchical Representations with Poincaré Variational Auto-Encoders. In *Advances in Neural Information Processing Systems 33*, 2019.

[6] T. Rainforth, A. R. Kosiorek, T. A. Le, C. J. Maddison, M. Igl, F. Wood, and Y. W. Teh. Tighter variational bounds are not necessarily better. In *Proceedings of the 35th International Conference on Machine Learning*, 2018.

[7] M. Garnelo, D. Rosenbaum, C. J. Maddison, T. Ramalho, D. Saxton, M. Shanahan, Y. W. Teh, D. J. Rezende, and S. Eslami. Conditional Neural Processes. In *Proceedings of the 35th International Conference on Machine Learning*, 2018.

[8] G. Tucker, A. Mnih, C. J. Maddison, D. Lawson, and J. Sohl-Dickstein. REBAR: Low-variance, unbiased gradient estimates for discrete latent variable models. In *Advances in Neural Information Processing Systems 31*, 2017.

[9] C. J. Maddison, A. Mnih, and Y. W. Teh. The Concrete Distribution: A Continuous Relaxation of Discrete Random Variables. In *International Conference on Learning Representations*, 2017.

[10] C. J. Maddison, D. Lawson, G. Tucker, N. Heess, M. Norouzi, A. Mnih, A. Doucet, and Y. W. Teh. Filtering Variational Objectives. In *Advances in Neural Information Processing Systems 31*, 2017.

[11] C. J. Maddison, A. Huang, I. Sutskever, and D. Silver. Move Evaluation in Go Using Deep Convolutional Neural Networks. In *International Conference on Learning Representations*, 2015.

[12] C. J. Maddison, D. Tarlow, and T. Minka. A* Sampling. In *Advances in Neural Information Processing Systems 27*, 2014.

[13] C. J. Maddison and D. Tarlow. Structured Generative Models of Natural Source Code. In *Proceedings of the 31st International Conference on Machine Learning*, 2014.

[14] R. Grosse, C. J. Maddison, and R. Salakhutdinov. Annealing Between Distributions by Averaging Moments. In *Advances in Neural Information Processing Systems 26*, 2013.

Refereed Workshop Presentations

[1] D. Lawson, G. Tucker, C. Naesseth, C. J. Maddison, R. Adams, and Y. W. Teh. Twisted Variational Sequential Monte Carlo. In *Bayesian Deep Learning Workshop, NeurIPS*, 2018.

[2] C. J. Maddison, D. Lawson, G. Tucker, N. Heess, A. Doucet, A. Mnih, and Y. W. Teh. Particle Value Functions. In *International Conference on Learning Representations Workshop*, 2017.

Book Chapters

[1] C. J. Maddison. Current Interpretability/Explainability Techniques in AI. In C. Morgan, editor, *Responsible AI: A Global Policy Framework*. The International Technology Law Association, 2019.

[2] C. J. Maddison. A Poisson process model for Monte Carlo. In T. Hazan, G. Papandreou, and D. Tarlow, editors, *Perturbation, Optimization, and Statistics*. MIT Press, 2016.

Preprints

[1] P. Vaezipoor, G. Lederman, Y. Wu, C. J. Maddison, R. Grosse, E. Lee, S. A. Seshia, and F. Bacchus. Learning Branching Heuristics for Propositional Model Counting. *arXiv e-prints*, July 2020, 2007.03204.

[2] C. J. Maddison, D. Paulin, Y. Whye Teh, and A. Doucet. Dual Space Preconditioning for Gradient Descent. *arXiv e-prints*, page arXiv:1902.02257, Feb. 2019, 1902.02257.

[3] D. Choi, C. J. Shallue, Z. Nado, J. Lee, C. J. Maddison, and G. E. Dahl. On Empirical Comparisons of Optimizers for Deep Learning. *arXiv e-prints*, page arXiv:1910.05446, Oct. 2019, 1910.05446.

[4] C. J. Maddison, D. Paulin, Y. Whye Teh, B. O'Donoghue, and A. Doucet. Hamiltonian Descent Methods. *ArXiv e-prints*, Sept. 2018, 1809.05042.