

David Madras

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RESEARCH INTERESTS

My aim is to make machine learning a more effective tool for high-stakes situations. My primary interests are fairness and discrimination in machine learning, using causal modelling to build more robust systems, and the role of automated tools in larger decision-making systems. I am also interested in uncertainty estimation and sensitivity analysis, AI safety, privacy, security, AI policy, generative modelling, and off-policy evaluation.

EDUCATION

- JAN. 2018 - PRESENT PH.D. Candidate (expected Sep. 2021), **University of Toronto**, Toronto, Canada
Advisor: [Richard Zemel](#)
- SEP. 2016 - JAN. 2018 MASTER OF SCIENCE, **University of Toronto**, Toronto, Canada
Thesis: Predict Responsibly: Improving Fairness and Accuracy by Learning to Defer
Advisor: [Richard Zemel](#)
- SEP. 2011 - JUN. 2016 BACHELOR OF SCIENCE, **University of Toronto**, Toronto, Canada
Major: Computer Science (specialist), with minors in Mathematics and Statistics
GPA: **3.92** (Dean's List)

PUBLICATIONS & PRE-PRINTS

- JUL 2020 Creager E., [Madras D.](#), Pitassi T., Zemel R. [Causal Modelling for Fairness in Dynamical Systems](#). *International Conference on Machine Learning, 2020*.
- APR. 2020 [Madras D.](#), Atwood J., D'Amour, A. [Detecting Extrapolation with Local Ensembles](#). *International Conference on Learning Representations, 2020*.
- JUN. 2019 Creager E., [Madras D.](#), Jacobsen J.-H., Weis M., Pitassi T., Zemel R. [Flexibly Fair Representation Learning by Disentanglement](#). *International Conference on Machine Learning, 2019*.
- JAN. 2019 [Madras D.](#), Creager E., Pitassi T., Zemel R. [Fairness Through Causal Awareness: Learning Latent-Variable Models for Biased Data](#). *ACM Conference on Fairness, Accountability and Transparency (ACM FAT*)*, 2019.
- DEC. 2018 [Madras D.](#), Pitassi T., Zemel R. [Predict Responsibly: Improving Fairness and Accuracy by Learning to Defer](#). *Neural Information Processing Systems, 2018*.
- JUN. 2018 [Madras D.](#), Creager E., Pitassi T., Zemel R. [Learning Adversarially Fair and Transferable Representations](#). *International Conference on Machine Learning, 2018*.
- FEB. 2018 Chan T.C.Y., [Madras D.](#), Puterman, M. [Improving fairness in match play golf through enhanced handicap allocation](#). *Journal of Sports Analytics, 2018*.
- FEB. 2017 Allen, S., [Madras D.](#), Ye Y., Zanotti, G. [Change-point Detection Methods for Body-Worn Video](#). *Society for Industrial and Applied Mathematics (SIAM) Undergraduate Research Online, 2018*.

WORKSHOP PAPERS

- APR. 2020 McCoy L., Burkell J., Card D., Davis B., Gichoya J., Le Page S., [Madras D.](#) Beyond "In the Loop": On The Role of Meaningful Human Control in High-Stakes Machine-Human Partnerships. (*Oral*), *WeRobot 2020*.
- APR. 2020 Creager E., [Madras D.](#), Pitassi T., Zemel R. Causal Modeling for Fairness in Dynamical Systems: A Case Study in Lending. *Workshop on Causal Learning and Decision-Making, ICLR 2020*.
- JUN. 2019 [Madras D.](#), Atwood J., D'Amour, A. Detecting Extrapolation with Influence Functions. *Workshop on Uncertainty and Robustness in Deep Learning (Oral)*, *ICML 2019*.

- DEC. 2018 **Madras D.**, Creager E., Pitassi T., Zemel R. Fairness Through Causal Awareness: Learning Latent-Variable Models for Biased Data. *Workshop on Ethical, Social and Governance Issues in AI (Spotlight)*, *NeurIPS 2018*.
- DEC. 2017 **Madras D.**, Pitassi T., Zemel R. Predict Responsibly: Improving Fairness and Accuracy by Learning to Defer. *Workshop on Transparent and Interpretable Machine Learning in Safety Critical Environments (Oral, Best Paper Award)*, *NeurIPS 2017*.

WORK EXPERIENCE

- FEB. 2019 | **Research Intern**, Google Brain, Cambridge, MA, USA
MAY. 2019 | Worked on methods for unreliability detection and sensitivity analysis with the Google Brain team, hosted by Alex D'Amour and James Atwood.
- SEP. 2014 | **Software Developer**, Ontario Financing Authority
APR. 2015 | Developed software using VB, C#, SQL; gathered requirements from traders and developers; succeeded in self-motivated work environment.

AWARDS AND HONORS

- SEP. 2019 | NSERC Alexander Graham Bell Canada Graduate Scholarship-Doctoral (CGS D)
DEC. 2017 | Best paper, *NeurIPS 2017 Workshop on Transparent and Interpretable Machine Learning in Safety Critical Environments*
SEP. 2016 | NSERC CGS Master's Fellowship
MAR. 2016 | 2nd Place, Waterfront International Quantathon, Graduate Division
MAY 2016 | Research in Industrial Projects for Students scholarship, Institute for Applied Mathematics, UCLA
MAY 2015 | Kupcinet-Getz scholarship, Weizmann Institute of Science
MAY 2014 | NSERC Undergraduate Student Research Award
SEP. 2014 | Louis Savlov Scholarship, University of Toronto
APR. 2013 | Award of Excellence for Achievement in Computer Science – Department of Computer Science, University of Toronto
SEP. 2011 | Reuben Leonard Wells Scholarship

LEADERSHIP

- JUL. 2020 | Co-organized inaugural workshop on [Participatory Approaches to Machine Learning](#) (ICML 2020)
NOV. 2019 | Organized inaugural Pan-Canadian Self-Organizing Conference on Machine Learning
2019-2020 | Organized Causal Inference reading group (Vector Institute)
2018 | Organized Fairness in Machine Learning reading group (Vector Institute)
2014-2015 | Co-president of Undergraduate Artificial Intelligence Group (UAIG), University of Toronto

TEACHING EXPERIENCE

- MAY 2019 | **African Institute of Mathematical Sciences**, Kigali, Rwanda
Assistant Instructor
Three-week course on Fairness & Privacy in Machine Learning at the African Masters of Machine Intelligence (<https://aimsammi.org/>)
- SEP. 2013 | **University of Toronto**, Toronto, Canada
PRESENT | *Teaching Assistant*
CSC411: Machine Learning and Data Mining, CSC412: Probabilistic Learning and Reasoning, CSC108: Introduction to Computer Programming, CSC148: Introduction to Computer Science

SERVICE

- REVIEWER: NeurIPS 2020, AISTATS 2020, NeurIPS 2019 Fair ML for Health Workshop, NeurIPS 2019, ICLR 2019 DebugML Workshop, ICML 2019, JMLR (2x)

MISCELLANY

- OCT. 2019 Attended NBER Economics of Artificial Intelligence Conference & Young Scholars Workshop (invitation only)
AUG. 2019 Attended Deep Learning Summer School, University of Montreal

GRADUATE COURSEWORK

- WINTER 2020 Statistical Learning Theory
WINTER 2020 Algorithms for Collective Decision-Making
FALL 2018 Fundamentals of Cryptography
WINTER 2018 Computational Social Science
WINTER 2017 Visual Recognition with Text
WINTER 2017 Algorithms & Complexity in Private Data Analysis
FALL 2016 Inference & Generative Models
FALL 2016 Computational Linguistics

INVITED TALKS

- MAY. 2020 *Causality in Machine Learning*
African Institute of Mathematical Sciences (Rwanda, Ghana)
AUG. 2019 *Machine Learning in Decision-Making Systems*
Schwartz Reisman Institute for Technology and Society (Toronto)
JUNE 2019 *Detecting Extrapolation with Influence Functions*
Workshop on Uncertainty and Robustness in Deep Learning, ICML 2019 (Long Beach)
MAY 2019 *Detecting Extrapolation with Influence Functions*
Google Brain (Cambridge)
FEB. 2019 *Predict Responsibly: Fairness in Machine Learning*
Princeton University (Princeton)
JAN. 2019 *Fairness Through Causal Awareness: Learning Latent-Variable Models for Biased Data*
ACM FAT* 2019 (Atlanta)
DEC. 2018 *Fairness Through Causal Awareness: Learning Latent-Variable Models for Biased Data*
Workshop on AI, Ethics & Governance, NeurIPS 2018 (Montreal)
OCT. 2018 *Predict Responsibly: Fairness in Machine Learning*
Toronto Deep Learning Series, Sidewalk Labs (Toronto)
SEP. 2018 *Learning Adversarially Fair and Transferable Representations*
Fairness in Machine Learning Workshop, Google Brain (Cambridge)
SEP. 2018 *Learning Adversarially Fair and Transferable Representations*
Google Brain (Toronto)
AUG. 2018 *Learning Adversarially Fair and Transferable Representations*
Radiation Medication Program Summer Series, Princess Margaret Hospital (Toronto)
JUL. 2018 *Learning Adversarially Fair and Transferable Representations*
Sunnybrook Health Sciences Centre (Toronto)
JUL. 2018 *Learning Adversarially Fair and Transferable Representations*
ICML 2018 (Stockholm)
APR. 2018 *Fairness in Machine Learning*
University in the Community (Toronto)
APR. 2018 *Predict Responsibly: Improving Fairness and Accuracy by Learning to Defer*
Design+AI Meetup, Normative AI (Toronto)
MAR. 2018 *Panel Discussion: Fairness and Interpretability in Machine Learning*
Integrate AI (Toronto)
APR. 2018 *Predict Responsibly: Improving Fairness and Accuracy by Learning to Defer*
Workshop on Transparent and Interpretable ML
in Safety Critical Environments, NeurIPS 2017 (Long Beach)
NOV. 2017 *Fairness in Machine Learning*
AI Day, University of Toronto (Toronto)