Travis Dick

Curriculum Vitae

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Research Interests

I am interested in building on the theory and practice of Machine Learning to accommodate several modern requirements of learning systems. In particular, I have projects on new requirements stemming from three distinct sources: making the best use of available data, applying learning tools to problems beyond standard prediction, and incorporating social values. I have also worked on actor-critic methods for Reinforcement Learning, Online Learning, and distributed learning.

Appointments

Research Scientist — 2021–present
Google LLC

Postdoctoral Researcher — 2019–2021
University of Pennsylvania, Warren Center for Network and Data Sciences

Visiting Scientist — 2019
Toyota Technical Institute at Chicago

Education

PhD in Computer Science — 2014-2019
Carnegie Mellon University
Supervisor: Prof. Maria-Florina Balcan

MSc in Computing Science — 2012-14
University of Alberta
Supervisors: Prof. Richard Sutton, Prof. András György

BSc Honours in Mathematics — 2011-12
University of Alberta

BSc Honours in Computing Science — 2007-11
University of Alberta

Internships

Google R/MI in NYC — Summer 2018
In the MAD-Science team. Hosted by Andrés Muños Medina and also worked with Kareem Amin, Alex Kulesza, and Sergei Vassilvitski

Yahoo! Research in NYC — Summer 2017
Advised by Dávid Pál

HONOURS AND AWARDS

Information Theory and Applications Workshop 2019
Invited Graduation Day Talk

China Theory Week, Tsinghua University 2018
Invited Talk

Heidelberg Laureate Forum 2017
Invited as a Young Researcher

CMU Machine Learning Department Teaching Assistant Award (One of 4 awards for 2016) 2017

Queen Elizabeth II Graduate Scholarship 2013-14

NSERC Alexander Graham Bell Scholarship, Masters Level 2013-14

University of Alberta Computing Science GPA Award 2013-14

NSERC Undergraduate Student Research Award 2009

PUBLICATIONS

JOURNAL PAPERS

Travis Dick, Cynthia Dwork, Michael Kearns, Terrance Liu, Aaron Roth, Giuseppe Vietri, Zhiwei Steven Wu, "Confidence-Ranked Reconstruction of Census Microdata from Published Statistics" in *PNAS*, 2023.

Avrim Blum, Travis Dick, Naren Manoj, Hongyang Zhang, "Random Smoothing Might be Unable to Certify L_∞ Robustness for High-Dimensional Images" in *JMLR*, 2020.

CONFERENCE PAPERS

Travis Dick, Jennifer Gillenwater, Matthew Joseph, "Better Private Linear Regression Through Better Private Feature Selection" in *ICML* 2023.

Robert Istvan Busa-Fekete, Heejin Choi, Travis Dick, Claudio Gentile, Andrés Muños Medina, "Easy Learning from Label Proportions" in *ICML*, 2023.

Travis Dick, Alex Kulesza, Ziteng Sun, Ananda Theertha Suresh, "Subset-Based Instance Optimality in Private Estimation" in *ICML*, 2023.

Mikhail Khodak, Kareem Amin, Travis Dick, Sergei Vassilvitski, "Learning-augmented private algorithms for multiple quantile release" in *ICML*, 2023.

CJ Carey, Travis Dick, Alessandro Epasto, Adel Javanmard, Josh Karlin, Shankar Kumar, Andrés Muños Medina, Vahab Mirrokni, Gabriel Henrique Nunes, Sergei Vassilvitski, Peilin Zhong, "Measuring Re-identification Risk", in *SIGMOD*, 2023.

Emily Diana, Travis Dick, Hadi Elzayn, Michael Kearns, Aaron Roth, Zachary Schutzman, Saeed Sharifi-Malvajerdi, Juba Ziani, "Algorithms and Learning for Fair Portfolio Design" in *EC*, 2021.

Maria-Florina Balcan, Dan DeBlasio, Travis Dick, Carl Kingsford, Tuomas Sandholm, Ellen Vitercik, "How much data is sufficient to learn high-performing algorithms?" in *STOC*, 2021.

Maria-Florina Balcan, Travis Dick, Wesley Pegden, "Semi-bandit Optimization in the Dispersed Setting" in *UAI*, 2020.

Maria-Florina Balcan, Travis Dick, Dravyansh Sharma, "Learning piecewise Lipschitz functions in changing environments" in *AISTATS*, Palermo, 2020.

Maria-Florina Balcan, Travis Dick, Manuel Lang, "Learning to Link" in *ICLR*, Addis Ababa, 2020.

Kareem Amin, Travis Dick, Alex Kulesza, Andrés Muños Medina, Sergei Vassilvitski, "Differentially Private Covariance Estimation" in *NeurIPS*, Vancouver, 2019.

Maria-Florina Balcan, Travis Dick, Ritesh Noothigattu, Ariel Procaccia, "Envy-free Classification" in *NeurIPS*, Vancouver, 2019.

Maria-Florina Balcan, Travis Dick, Colin White, "Data-Driven Clustering via Parameterized Lloyd's Families" in *NeurIPS*, Montreal, 2018.

Maria-Florina Balcan, Travis Dick, Ellen Vitercik, "Dispersion for Data-Driven Algorithm Design, Online Learning, and Private Optimization" in *FOCS*, Paris, 2018.

Maria-Florina Balcan, Travis Dick, Tuomas Sandholm, Ellen Vitercik, "Learning to Branch" in *ICML*, Stockholm, 2018.

Maria-Florina Balcan, Travis Dick, Yingyu Liang, Wenlong Mou, Hongyang Zhang, "Differentially Private Clustering in High-Dimensional Euclidean Spaces" in *ICML*, Sydney, 2017.

Travis Dick, Mu Li, Venkata Krishna Pillutla, Colin White, Maria-Florina Balcan, Alex Smola, "Data Driven Resource Allocation for Distributed Learning" in *AIStats*, Fort Lauderdale, 2017.

Maria-Florina Balcan, Travis Dick, Yishay Mansour, "Label Efficient Learning by Exploiting Multi-class Output Codes" in *AAAI*, San Francisco, 2017.

Travis Dick, András György, Csaba Szepesvári, "Online Learning in Markov Decision Processes with Changing Cost Sequences" in *31st International Conference on Machine Learning (ICML)*, Beijing, 2014.

Patrick Pilarski, Travis Dick, Richard Sutton, "Real-time Prediction Learning for the Simultaneous Actuation of Multiple Prosthetic Joints" in *IEEE International Conference on Rehabilitation Robotics (ICORR)*, Seattle, 2013.

Travis Dick, András György, Csaba Szepesvári, "Online Learning in Markov Decision Processes with Changing Reward Sequences" in *1st Multidisciplinary Conference on Reinforcement Learning and Decision Making (RLDM)*, Princeton, 2013.

Roshan Shariff, Travis Dick, "Lunar Lander: A Continuous-Action Case Study for Policy Gradient Actor Critic Algorithms" in 1st Multidisciplinary Conference on Reinforcement Learning and Decision Making (RLDM), Princeton, 2013.

Travis Dick, Camilo Perez, Azad Shademan, Martin Jagersand, "Realtime Registration-based Tracking via Approximate Nearest Neighbour Search," in *Robotics Science and Systems (RSS)*, Berlin, 2013.

Workshop Papers

Maria-Florina Balcan, Travis Dick, Kai Wen Wang, "Scalable and provably accurate algorithms for differentially private distributed decision tree learning" in *AAAI Workshop on Privacy-Preserving Artificial Intelligence*, New York, 2020.

Kareem Amin, Travis Dick, Alex Kulesza, Andrés Muños Medina, Sergei Vassilvitski, "Private Covariance Estimation via Iterative Eigenvector Sampling" in *NeurIPS Privacy Preserving Machine Learning*

Workshop, Montreal, 2018.

Maria-Florina Balcan, Travis Dick, Ritesh Noothigattu, Ariel Procaccia, "Envy-free Classification" in *NeurIPS Workshop on Ethical, Social, and Governance Issues in AI*, Montreal, 2018.

Maria-Florina Balcan, Travis Dick, Ellen Vitercik, "Dispersion for Private Optimization of Piecewise Lipschitz Functions" in *Privacy in Machine Learning and AI Workshop*, Stockholm, 2017.

Maria-Florina Balcan, Travis Dick, Ellen Vitercik, "Dispersion for Private Optimization of Piecewise Lipschitz Functions" in *Privacy in Machine Learning and AI Workshop*, Stockholm, 2017.

Maria-Florina Balcan, Travis Dick, Ellen Vitercik, "Differentially Private Algorithm Configuration" in *ICML Private and Secure Machine Learning Workshop*, Sydney, 2017.

Travis Dick, Mu Li, Venkata Krishna Pillutla, Colin White, Maria-Florina Balcan, Alex Smola, "Data Driven Resource Allocation for Distributed Learning" in *AAAI Distributed Machine Learning Workshop*, San Francisco, 2017.

Maria-Florina Balcan, Travis Dick, Yishay Mansour, "On the Geometry of Output-code Multi-class Learning," in *ICML Data Efficient Machine Learning Workshop*, New York, 2016.

Additional Work

Travis Dick, "Machine Learning: Social Values, Data Efficiency, and Beyond Prediction" PhD Thesis Proposal, Carnegie Mellon University, 2019
Thesis Committee: Maria-Florina Balcan, Yishay Mansour, Tom Mitchell, and Ariel Procaccia.

Travis Dick, "Gradient Methods for Online Reinforcement Learning," Masters Thesis, University of Alberta, 2014.

Research Talks

Invited Talks

How much data is sufficient to learn high-performing algorithms?

- Talk at TTIC Workshop on Automated Algorithm Design. 2019

Dispersion for Data-Driven Algorithm Design, On- line Learning, and Private Optimization

- Talk at the Civil Engineering Machine Learning Seminar at CMU. 2019
- Graduation Day Talk at Information Theory and Applications Workshop. 2019
- Talk at China Theory Week. 2018

Envy-free Learning

- Poster at NeurIPS. 2019
- Poster at Google Fairness in Machine Learning Workshop. 2018

Label Efficient Learning by Exploiting Multi-class Output Codes

- Talk at Picky Learners Workshop at ICML. 2017

Other Talks

Algorithms and Learning for Fair Portfolio Design

- Talk at EC. 2021

Semi-bandit Optimization in the Dispersed Setting

- Talk at UAI. 2020

Learning to Link

- Talk at ICLR. 2020

Machine Learning: Social Values, Data Efficiency, and Beyond Prediction

- Talk at University of Pennsylvania Department of Computer and Information Science. 2019
- Talk at Toyota Technical Institute at Chicago. 2019
- Thesis Proposal at Carnegie Mellon University. 2019

Private Covariance Estimation via Iterative Eigenvector Sampling

- Poster at NeurIPS. 2019
- Poster at NeurIPS Privacy Preserving Machine Learning Workshop. 2018

Envy-free Learning

- Poster at NeurIPS. 2019
- Poster at NeurIPS Workshop on Ethical, Social, and Governance Issues in AI. 2018

Data-driven Clustering via Parameterized Lloyd's Families

- Splotlight talk at NeurIPS. 2018

Dispersion for Data-Driven Algorithm Design, On- line Learning, and Private Optimization

- Talk at FOCS. 2018

Learning to Branch

- Poster at ICML. 2018

Differentially Private Algorithm Configuration

- Poster Presentation at Privacy in Machine Learning and AI workshop at ICML. 2018
- Poster Presentation at Private and Secure Machine Learning Workshop at ICML. 2017

Data Driven Resource Allocation for Distributed Learning

- AI Lunch Seminar at CMU. 2017
- 10 Minute Talk at AAAI Distributed Machine Learning Workshop. 2017

Label Efficient Learning by Exploiting Multi-class Output Codes

- AAAI Poster Presentation. 2017
- 10 minute talk at ICML Data Efficient Machine Learning Workshop. 2016
  (One of 5 talks out of 27 accepted papers).
- Theory Lunch Seminar at CMU. 2016

Online Learning in Markov Decision Processes with Changing Cost Sequences

- 10 Minute Talk at ICML. 2014
- RLDM Poster Presentation. 2013

Teaching and Academic Service

Area Chair

I was an area chair for NeurIPS in 2020 and 2021.

Conference Reviewing

I was a reviewer for AAAI (2017, 2019, 2020), NeurIPS (2016, 2017, 2018), ICML (2016, 2017, 2018, 2019, 2020), STOC (2017, 2019, 2020), and ALT 2019.

Journal Reviewing 2016 & 2017

I reviewed twice for the Machine Learning Journal (2016, 2017) and for the IEEE Transaction on Wireless Communications in 2019.

Guest Lecture on Differential Privacy for 10-715, Advanced Introduction to Machine Learning 2017

In the Fall semester of 2017 I gave a guest lecture on Differential Privacy and Machine Learning for the 10-701 class at CMU, advanced introduction to machine learning.

Group Leader for Heidelberg Laureate Forum Workshop 2017

In the summer of 2017 I attended the Heidelberg Laureate Forum as a young researcher. I was asked to lead the discussions on differential privacy and digital authentication at the "Privacy and Digital Authentication" workshop held there.

Teaching Assitant for 10-601, Introduction to Machine Learning 2015 & 2016

In the Spring terms of 2015 and 2016 I was a teaching assistant for an introductory machine learning course taught by Profs. Maria-Florina Balcan and William W. Cohen in 2016 and Profs. Maria-Florina Balcan and Tom Mitchell in 2015. Both years the class had an enrollment of approximately 150 students and 7 TAs.

Learning Theory Reading Group 2015 & 2016

In 2015 and 2016 I organized the learning theory reading group at CMU. We currently have weekly meetings and approximately 10 members.

ACPG Working Group 2012-13

In the 2012-13 academic year, I organized a working group at the University of Alberta for researching actor critic and policy gradient algorithms for reinforcement learning. The group of 17 met every Friday.

EXTRACURRICULAR ACTIVITIES

UofA Programming Team 2009-10

In 2009 and 2010 I was a member of the University of Alberta programming team. We competed in the ACM international Collegiate Programming Competition (ICPC) regional qualifying rounds. Both years we placed first in the Rocky Mountain region and advanced to represent the University of Alberta internationally at the world finals in Stockholm, Sweden and Harbin, China, respectively.