Gavin R. Brown **Curriculum Vitae**

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Education

PhD Student in Computer Science
Boston University, Boston, Massachusetts
Cumulative GPA: 3.89 / 4.0

Bachelor of Science in Mathematics, May 2015
Case Western Reserve University, Cleveland, Ohio
Cumulative GPA: 3.36 / 4.0

Research Experience

Graduate Research Assistant, advised by Adam Smith September 2019 – Present
Computer Science Department, Boston University

- Theoretical research into differential privacy and machine learning.
- Current focus is on understanding why modern algorithms may memorize or encode parts of their training data, and how this behavior might be necessary for high accuracy.

Graduate Research Assistant, advised by Peter Chin September 2017 – December 2019
Computer Science Department, Boston University

- Developed imaging algorithms for a compressed sensing biological microscope.

Computational Biological Modeling December 2014 – May 2015
Mathematics Department, CWRU

- Modeled seasonal snail populations for disease prediction, advised by David Gurarie.
- Results led to Senior Capstone Thesis Presentation.

Theoretical Modeling for Applied Physics May 2012 – May 2013
Physics Department, CWRU

- Modeled polymers in electric fields for use in efficient capacitors, advised by Philip Taylor.

Professional Experience

Junior Associate June 2015 – May 2016
Mu Sigma; Bangalore, India, and Wallingford, Connecticut

- Coordinated and executed data analysis with team of eight offshore associates
- Used statistics and machine learning techniques on large-scale marketing problems

Teaching Experience

Boston University Teaching Fellow

- CS 537 – Randomness in Computing, Spring 2020, with Sofya Raskhodnikova
- CS 330 – Introduction to Algorithms, Fall 2019, with Adam Smith
- CS 542 – Machine Learning, Summer I 2019, with Peter Chin
- CS 112 – Introduction to Computer Science II, Fall 2018, with Christine Papadakis-Kanaris
- CS 542 – Machine Learning, Spring 2018, with Peter Chin

GRE and SAT Instructor, Kaplan Test Prep

Technical Skills

Machine learning, differential privacy, data analysis, Bayesian computation, information theory, linear algebra, Python, Pytorch, TensorFlow, written communication, oral communication.

Key Graduate Coursework

- CS 591 – Adaptive Data Analysis
- MA 882 – Large-Scale Bayesian Methods
- CS 537 – Randomness in Computing
- CS 511 – Formal Methods
- MA 717 – Functional Analysis
- CS 640 – Artificial Intelligence
- CS 591 – Introduction to Natural Language Processing
- CS 535 - Computational Complexity

Publications

- **Gavin Brown**, Marco Gaboardi, Adam Smith, Jonathan Ullman, and Lydia Zakynthinou. "Covariance-Aware Private Mean Estimation Without Private Covariance Estimation." To appear as a Spotlight Presentation at NeurIPS 2021. https://arxiv.org/abs/2106.13329
- **Gavin Brown**, Mark Bun, Vitaly Feldman, Adam Smith, and Kunal Talwar. "When is Memorization of Irrelevant Training Data Necessary for High-Accuracy Learning?" STOC 2021. https://arxiv.org/abs/2012.06421
- **Gavin Brown**, Shlomi Hod, and Iden Kalemaj. "Performative Prediction in a Stateful World." NeurIPS 2020 Workshop on Consequential Decision Making in Dynamic Environments. https://arxiv.org/abs/2011.03885
- Louis Jensen, **Gavin Brown**, Xiao Wang, Jacob Harer, and Sang Chin. "Deep Learning for Minimal-context Block Tracking through Side-channel Analysis." *ICASSP 2019*. IEEE, 2019.
- Xiao Wang, Quan Zhou, Jacob Harer, **Gavin Brown**, Shangran Qiu, Zhi Dou, John Wang, Alan Hinton, Carlos A. Gonzalez, and Peter Chin. "Deep learning-based classification and anomaly detection of side-channel signals." *Cyber Sensing 2018*. Vol. 10630. International Society for Optics and Photonics, 2018.
- Sang Chin, Jonathan Cohen, Alison Albin, Mykola Hayvanovych, Elizabeth Reilly, **Gavin Brown,** and Jacob Harer. "A Mathematical Analysis of Network Controllability Through Driver Nodes." *IEEE Transactions on Computational Social Systems* 4, no. 2 (2017): 40-51.
- Jiayuan Miao, **Gavin Brown**, and Philip Taylor. "Theoretically guided design of efficient polymer dielectrics." *Journal of Applied Physics* 115.9 (2014): 094104.

Talks

- STOC. "When Is Memorization of Irrelevant Training Data Necessary for High-Accuracy Learning?" June 21, 2021.
- Penn State University Statistical Data Privacy Seminar. "When Is Memorization of Entire Examples Necessary for High-Accuracy Learning?" May 6, 2021.
- Hebrew University Theory Seminar. "When Is Memorization of Entire Examples Necessary for High-Accuracy Learning?" May 5, 2021.
- Workshop on the Theory of Overparameterized Machine Learning. "When Is Memorization of Irrelevant Training Data Necessary for High-Accuracy Learning?" April 20, 2021.
- Boston University Probability and Statistics Seminar. "When Is Memorization of Entire Examples Necessary for High-Accuracy Learning?" April 11, 2021.

Poster Presentations

- Theory and Practice of Differential Privacy, "When Is Memorization of Irrelevant Training Data Necessary for High-Accuracy Learning?" July 23, 2021
- Theory and Practice of Differential Privacy, "Covariance-Aware Private Mean Estimation Without Private Covariance Estimation." July 23, 2021
- STOC. "When Is Memorization of Irrelevant Training Data Necessary for High-Accuracy Learning?" June 21, 2021.
- Google Differential Privacy Workshop. "When is memorization of entire examples necessary for high-accuracy learning." February 11, 2021.