

# Brian Bullins

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**EDUCATION**     **Princeton University**, Princeton, NJ     September 2014 - Present  
Ph.D. Candidate in Computer Science  
Advisor: Prof. Elad Hazan

**Duke University**, Durham, NC     August 2010 - May 2014  
B.S. in Computer Science and A.B. in Mathematics

**RESEARCH INTERESTS**     My work lies at the intersection of optimization and machine learning, both in theory and practice. In particular, my research on improving matrix estimation techniques has led to faster second-order methods for convex and non-convex optimization.

**PUBLICATIONS**     Generalize Across Tasks: Efficient Algorithms for Linear Representation Learning. Brian Bullins, Elad Hazan, Adam Kalai, Roi Livni. To appear in *Conference on Algorithmic Learning Theory (ALT)*, 2019.

The Case for Full-Matrix Adaptive Regularization. Naman Agarwal, Brian Bullins, Xinyi Chen, Elad Hazan, Karan Singh, Cyril Zhang, Yi Zhang. *Workshop on Modern Trends in Nonconvex Optimization, ICML 2018*.

Not-So-Random Features. Brian Bullins, Cyril Zhang, Yi Zhang. *International Conference on Learning Representations (ICLR)*, 2018.

Finding Approximate Local Minima Faster than Gradient Descent. Naman Agarwal, Zeyuan Allen-Zhu, Brian Bullins, Elad Hazan, Tengyu Ma. *Symposium on Theory of Computing (STOC)*, 2017.

Second-Order Stochastic Optimization for Machine Learning in Linear Time. Naman Agarwal, Brian Bullins, Elad Hazan. *Journal of Machine Learning Research (JMLR)*, 18(116):1-40, 2017.

**INFORMS Optimization Society Student Paper Prize, Honorable Mention.**

The Limits of Learning with Missing Data. Brian Bullins, Elad Hazan, Tomer Koren. *Neural Information Processing Systems (NIPS)*, 2016.

Spectral properties of modularity matrices. Marianna Bolla, Brian Bullins, Sorathan Chaturapruek, Shiwen Chen, Katalin Friedl. *Linear Algebra and its Applications*, 473:359–76, 2015.

**MANUSCRIPTS**     Fast minimization of structured convex quartics. Brian Bullins. *Manuscript*.

Adaptive regularization with cubics on manifolds with a first-order analysis. Naman Agarwal, Nicolas Boumal, Brian Bullins, Coralia Cartis. *Manuscript, under submission*.

**RESEARCH EXPERIENCE**     **Princeton University, Dept. of Computer Science**     Fall 2014 - Present  
My research has primarily focused on developing second-order stochastic methods for both convex and non-convex optimization that run in linear time (in the input representation).

**Visiting Researcher at Technion**, Haifa, Israel     Summer 2015

Worked with Prof. Elad Hazan to develop and understand the limitations of machine learning methods that can perform in the presence of noisy or missing data.

**Duke University, Dept. of Computer Science** Summer 2013 - Spring 2014  
Conducted research with Prof. Alexander Hartemink on an improved chromatin prediction hidden Markov model which accounts for bias in DNase-seq data.

**Budapest Semesters in Mathematics**, Budapest, Hungary Spring 2013  
Researched spectral clustering of networks with Prof. Marianna Bolla, studied properties of the modularity matrix.

**INDUSTRY  
EXPERIENCE**

**Google Brain, Student Researcher**, Princeton, NJ January 2018 - Present  
Developing and analyzing efficient full-matrix adaptive regularization methods for optimizing deep networks.  
*Supervisor: Yoram Singer*

**In8 Inc., Research Intern**, Princeton, NJ Summer 2017  
Researched improved hyperparameter optimization methods for deep learning architectures.

**NVIDIA, Research Intern**, Santa Clara, CA Summer 2016  
Studied variance-based adaptive regularization of stochastic gradient descent methods, targeting deep learning applications.  
*Supervisor: Boris Ginsburg*

**Coursera, Software Development Intern**, Mountain View, CA Summer 2014  
Worked on migrating prior back-end architecture to new development stack.

**TEACHING  
EXPERIENCE**

**Teaching Assistant**, Princeton University  
COS 511: Theoretical Machine Learning Spring 2016  
COS 402: Artificial Intelligence Fall 2015

**HONORS**

**INFORMS Optimization Society Student Paper Prize, Honorable Mention**, 2018  
**Siebel Scholar**, Class of 2019  
**Benjamin N. Duke Scholar** (full merit scholarship, Duke University), 2010-2014  
**Computer Science Undergraduate Research Fellow**, 2013  
**Attended Budapest Semesters in Mathematics**, 2013

**SERVICE**

**Reviewer:** NeurIPS, ICML, COLT, Mathematical Programming