Blake Woodworth

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Education

Inria Paris
Postdoctoral Researcher 2021-2023
Advisor: Francis Bach

Toyota Technological Institute at Chicago
Ph.D. in Computer Science 2015-2021
M.S. in Computer Science 2015-2017
Advisor: Nathan Srebro

Yale University 2011-2015
B.S. in Computer Science with Distinction, Summa Cum Laude
Advisor: Daniel Spielman

Publications

The Minimax Complexity of Distributed Optimization
Blake Woodworth
PhD Thesis, 2021.

A Stochastic Newton Algorithm for Distributed Convex Optimization
Brian Bullins, Kumar Kshitij Patel, Ohad Shamir, Nathan Srebro, *Blake Woodworth*
NeurIPS, 2021.

An Even More Optimal Stochastic Optimization Algorithm: Minibatching and Interpolation Learning
Blake Woodworth, and Nathan Srebro.
NeurIPS 2021.

On the Implicit Bias of Initialization Shape: Beyond Infinitesimal Mirror Descent
Shahar Azulay, Edward Moroshko, Mor Shpigel Nacson, *Blake Woodworth*, Nathan Srebro, Amir Globerson, and Daniel Soudry.
ICML 2021.

The Min-Max Complexity of Distributed Stochastic Convex Optimization with Intermittent Communication
Blake Woodworth, Brian Bullins, Ohad Shamir, and Nathan Srebro.
COLT 2021. Best Paper Award.

Mirrorless Mirror Descent: A More Natural Discretization of Riemannian Gradient Flow
Suriya Gunasekar, *Blake Woodworth*, and Nathan Srebro.
AISTATS 2021.

Implicit Bias in Deep Linear Classification: Initialization Scale vs Training Accuracy
Edward Moroshko, Suriya Gunasekar, *Blake Woodworth*, Jason D. Lee, Nathan Srebro, and Daniel Soudry.
NeurIPS 2020.

Minibatch vs Local SGD for Heterogeneous Distributed Learning
Blake Woodworth, Kumar Kshitij Patel, and Nathan Srebro.
NeurIPS 2020.

Is Local SGD Better than Minibatch SGD?
Blake Woodworth, Kumar Kshitij Patel, Sebastian U. Stich, Zhen Dai, Brian Bullins, H. Brendan McMahan, Ohad Shamir, and Nathan Srebro.
ICML 2020.

Kernel and Deep Regimes in Overparametrized Models
Blake Woodworth, Suriya Gunasekar, Jason D. Lee, Edward Moroshko, Pedro Savarese, Itay Golan, Daniel Soudry, and Nathan Srebro.
COLT 2020.

The Gradient Complexity of Linear Regression
Mark Braverman, Elad Hazan, Max Simchowitz, and *Blake Woodworth*.
COLT 2020.

Lower Bounds for Non-Convex Stochastic Optimization
Yossi Arjevani, Yair Carmon, John C. Duchi, Dylan J. Foster, Nathan Srebro, and *Blake Woodworth*.
Submitted.

Guaranteed Validity for Empirical Approaches to Adaptive Data Analysis
Ryan Rogers, Aaron Roth, Adam Smith, Nathan Srebro, Om Thakkar, and *Blake Woodworth*.
AISTATS 2020.

Open Problem: The Oracle Complexity of Convex Optimization with Limited Memory
Blake Woodworth and Nathan Srebro.
COLT 2019.

The Complexity of Making the Gradient Small in Stochastic Convex Optimization
Dylan J. Foster, Ayush Sekhari, Ohad Shamir, Nathan Srebro, Karthik Sridharan, and *Blake Woodworth*.
COLT 2019. Best Student Paper Award.

Graph Oracle Models, Lower Bounds, and Gaps for Parallel Stochastic Optimization
Blake Woodworth, Jialei Wang, Brendan McMahon, and Nathan Srebro.
NeurIPS 2018.

Training Well-Generalizing Classifiers for Fairness Metrics and Other Data-Dependent Constraints
Andrew Cotter, Maya Gupta, Heinrich Jiang, Nathan Srebro, Karthik Sridharan, Serena Wang, *Blake Woodworth*, and Seungil You.
FAT/ML 2018, ICML 2019.

The Everlasting Database: Statistical Validity at a Fair Price
Blake Woodworth, Vitaly Feldman, Saharon Rosset, and Nathan Srebro.
NeurIPS 2018.

Lower Bound for Randomized First Order Convex Optimization
Blake Woodworth and Nathan Srebro.
Technical Report 2017.

Implicit Regularization in Matrix Factorization
Suriya Gunasekar, *Blake Woodworth*, Srinadh Bhojanapalli, Behnam Neyshabur, and Nathan Srebro.
NeurIPS 2017.

Learning Non-Discriminatory Predictors
Blake Woodworth, Suriya Gunasekar, Mesrob I. Ohannessian, and Nathan Srebro.
COLT 2017.

Tight Complexity Bounds for Optimizing Composite Objectives
Blake Woodworth and Nathan Srebro.
NeurIPS 2016.

Fellowships and Awards

COLT Best Paper Award 2021

COLT Best Student Paper Award, 2019.

Google Research PhD Fellowship, 2019.

NSF Graduate Research Fellowship, 2017.

Best Poster Award, TTIC Student Workshop, 2016.

Phi Beta Kappa Society Junior Year Inductee, 2013.

Internships

Google Research, Princeton, NJ, Summer 2019.
Worked with Elad Hazan and Naman Agarwal on online learning and optimization algorithms.

Microsoft Research, Cambridge, UK, Summer 2017.
Collaborated with Ryota Tomioka and Alex Gaunt to implement graph neural networks in Tensorflow, optimize them for performance, and apply them to prediction tasks on protein data.

Service

Conference Reviewing *NeurIPS*, *COLT*, *ICML*, *ICLR*, *AISTATS*, *FAT*

Journal Reviewing *JMLR*, *SIMODS*, *Mathematics of Optimization Research*

Co-Organizer 2019 TTIC Student Workshop

Teaching

Teaching Assistant, Statistical and Computational Learning Theory, Professor Nathan Srebro
TTIC, Fall 2018

Teaching Assistant, Convex Optimization, Professor Nathan Srebro
TTIC, Winter 2018

Teaching Assistant, Mathematical Toolkit, Professor Madhur Tulsiani
TTIC, Fall 2016

Peer Tutor, Data Structures and Programming Techniques, Professor Stanley Eisenstat
Yale University, Spring 2014, 2015

Peer Tutor, Systems Programming & Computer Organization, Professor Stanley Eisenstat
Yale University, Fall 2014

Peer Tutor, Introduction to Computer Science, Professor Dana Angluin
Yale University, Spring 2013

Undergraduate Research Experience

Senior Research, Advisor: Dr. Daniel Spielman Fall 2014
Studied approximation algorithms for the sparsest cut problem in graph theory, efficiently implemented four different algorithms and applied them to large, real world graphs.

Undergraduate Research Assistant, Advisor: Dr. Daniel Spielman Summer 2014
Collaborated with three other students to implement a fast linear systems solver and, as an application of the solver, a maximum flow problem solved as a linear program using interior point methods.