

Adam Block

Updated February 27, 2024

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Research interests Sequential Decision Making, Online Learning, Sampling, Intrinsic Dimension Estimation

Education **MIT** Cambridge, MA
PhD in Mathematics and Statistics 09/2019 Year – 05/2024 (expected)
Advisor: Alexander Rakhlin

Columbia University New York, New York
BA in Mathematics (Summa cum Laude) 09/2015 Year – 05/2019

Honors Finalist for Jane Street Graduate Research Fellowship 2023
NeurIPS 2022 Scholar Award 2022
COLT 2022 Deepmind Student Travel Grant 2022
SIGIR 2022 Student Travel Award 2022
NSF Graduate Research Fellowship 2019-Present
Phi Beta Kappa (Early designation) 2019
I.I. Rabi Scholar (Columbia University) 2015-2019

Publications **Butterfly Effects of SGD Noise: Error Amplification in Behavior Cloning and Autoregression**
Adam Block, Dylan J. Foster, Akshay Krishnamurthy, Max Simchowitz, and Cyril Zhang
ICLR 2024

Smoothed Online Learning for Prediction in Piecewise Affine Systems
Adam Block, Max Simchowitz, and Russ Tedrake
NeurIPS 2023 (Spotlight)

On the Imitation of Non-Markovian Demonstrations: From Low-Level Stability to High Level Planning
Adam Block, Ali Jadbabaie, Daniel Pfrommer, Max Simchowitz, and Russ Tedrake
ICML 2023, Workshop on Optimal Transport in Learning, Control, and Dynamical Systems
NeurIPS 2023

Efficient Model-Free Exploration in Low-Rank MDPs
Zak Mhammedi, Adam Block, Dylan Foster, and Alexander Rakhlin

NeurIPS 2023

Oracle-Efficient Smoothed Online Learning for Piecewise Continuous Decision Making

Adam Block, Max Simchowitz, and Alexander Rakhlin

COLT 2023

The Sample Complexity of Approximate Rejection Sampling With Applications to Smoothed Online Learning

Adam Block and Yury Polyanskiy

COLT 2023

Efficient and Near-Optimal Smoothed Online Learning for Generalized Linear Functions

Adam Block and Max Simchowitz

NeurIPS 2022

Intrinsic Dimension Estimation using Wasserstein Distance

Adam Block, Zeyu Jia, Yury Polyanskiy, and Alexander Rakhlin.

Journal of Machine Learning Research (Accepted 2022)

Smoothed Online Learning is as Easy as Statistical Learning

Adam Block, Yuval Dagan, Noah Golowich, and Alexander Rakhlin

COLT 2022

Counterfactual Learning To Rank for Utility-Maximizing Query Auto-completion

Adam Block, Rahul Kidambi, Thorsten Joachims, Daniel N. Hill, and Inderjit S. Dhillon

SIGIR 2022

Majorizing Measures, Sequential Complexities, and Online Learning

Adam Block, Yuval Dagan, and Alexander Rakhlin.

COLT 2021

Probability Theory and Related Fields (in revision)

Preprints

On the Performance of Empirical Risk Minimization with Smoothed Data

Adam Block, Alexander Rakhlin, and Abhishek Shetty

arxiv preprint arXiv:2402.14987

Oracle-Efficient Differentially Private Learning with Public Data

Adam Block, Mark Bun, Rathin Desai, Abhishek Shetty, and Zhiwei Steven Wu

arxiv preprint arXiv:2402.09483

Rate of Convergence of the Smoothed empirical Wasserstein Distance

Adam Block, Zeyu Jia, Yury Polyanskiy, and Alexander Rakhlin

arxiv preprint arXiv:2205.02128

Fast mixing of multi-scale langevin dynamics under the manifold hypothesis

Adam Block, Youssef Mroueh, Jerret Ross, and Alexander Rakhlin.

arXiv preprint arXiv:2006.11166

Generative modeling with denoising auto-encoders and Langevin sampling

Adam Block, Youssef Mroueh, and Alexander Rakhlin.

arXiv preprint arXiv:2002.00107, 2020.

Research experience
(Math)

Cohomology of Schur Functors Indexed by Hook Partitions

Mentor: Daniel Litt (Columbia University) 09/2015 – 05/2019

Bounding the Frobenius Amplitude of vector bundles on schemes over positive characteristic. Used SageMath and Python for computations.

Persistent Homology of Point Cloud Data

Mentor: Benjamin Antieau (University of Illinois at Chicago) 09/14 – 05/15

Explored the algebro-topological invariants of random point-cloud data and began working towards creating an efficient package in SageMath for calculating said invariants.

Work experience

Research Intern at Microsoft Research NYC

Mentors: Cyril Zhang, Akshay Krishnamurthy, Dylan Foster

Worked on understanding the inductive biases of different training approaches to deep networks for behavior cloning and NLP.

Applied Science Intern at Amazon Science

Mentors: Rahul Kidambi (Amazon), Thorsten Joachims (Cornell) 05/21 – 10/21

Improved Amazon's auto-complete feature with a new method relying on counterfactual estimation in ranking as a member of the MIDAS team.

Talks

Smoothed Online Learning: Theory and Applications 11/2023

Columbia University Theory Student Seminar

Smoothed Online Learning: Theory and Applications 10/2023

Google Research Learning Theory Seminar

Tackling Combinatorial Distribution Shift: A Matrix Completion Perspective 07/2023

COLT 2023 (on behalf of Max Simchowitz, Kaiqing Zhang, and Abhishek Gupta)

Entropic characterization of optimal rates for learning Gaussian mixtures 07/2023

COLT 2023 (on behalf of Zeyu Jia, Yury Polyanskiy, and Yihong Wu)

Minimax optimal testing by classification 07/2023

COLT 2023 (on behalf of Patrik Gerber, Yanjun Han, and Yury Polyanskiy)

Imitation of Non-Markovian Demonstrations 06/2023

Microsoft Research Reinforcement Learning Seminar

Intrinsic Dimension Estimation with Wasserstein Distances 11/2022

McMaster University Applied Probability Seminar

Intrinsic Dimension Estimation with Wasserstein Distances 02/2022

MIT LIDS & Stats Tea Talk

Generative Modeling with Langevin Dynamics 12/2020

Methods of Deep Learning Workshop

Sampling with Langevin Dynamics 06/2020

MIT-IBM Machine Learning Reading Group (Host: Youssef Mroueh)

Generative Modeling with De-Noising Auto-Encoders and Langevin Dynamics 04/2020

Carnegie-Mellon ML Reading Group (Host: Andrej Risteski)

Service

Reviewer

COLT 2020, ALT 2020, NeurIPS 2020, COLT 2021, *Annals of Statistics*, *Bernoulli*, COLT 2022, MIT SDSCON 2022, IEEE Transactions on Information Theory, *Journal of Machine Learning Research*, COLT 2023 PC, ALT 2023 PC, COLT 2024 PC

Skills

Programming

Proficient in: PyTorch, Python, Julia, L^AT_EX, PySpark

Familiar with: TensorFlow