

Andrej Risteski

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Short biography

I hold a joint position as the Norbert Wiener Fellow at the Institute for Data Science and Statistics (IDSS) and an instructor of Applied Mathematics at MIT.

Before coming to MIT, I was a PhD student in the Computer Science Department at Princeton University, working under the advisement of Sanjeev Arora. Previously I received my B.S.E. degree at Princeton University as well.

I work in the intersection of machine learning and theoretical computer science, with the primary goal of designing provable and practical algorithms for problems arising in machine learning.

Appointments

2017-present Norbert Wiener Fellow at Institute for Data Science and Statistics (IDSS) and Applied Mathematics at MIT

Education

2012-2017 PhD in Computer Science, advised by Sanjeev Arora - Princeton University

Focus: Theoretical Computer Science and Machine Learning

2008-2012 Bachelor of Science in Eng. in Computer Science, summa cum laude- Princeton University

Acquired *Certificate in Applied and Computational Mathematics*

Selected publications (sorted by time of publication)

Understanding representations

- Approximability of Discriminators Implies Diversity in GANs. With Yu Bai and Tengyu Ma. Manuscript 2018.
- Do GANs Learn the Distribution? Some Theory and Empirics. With Sanjeev Arora and Yi Zhang. ICLR 2018
- Representational Power of ReLU Networks and Polynomial Kernels: Beyond Worst-Case Analysis. With Frederic Koehler. Manuscript 2018.
- Linear Algebraic Structure of Word Senses, with Applications to Polysemy. With Sanjeev Arora, Yuanzhi Li, Yingyu Liang and Tengyu Ma. Transactions of the Association for Computational Linguistics (TACL) 2018.
- RAND-WALK: A Latent Variable Model Approach to Word Embeddings. With Sanjeev Arora, Yuanzhi Li, Yingyu Liang and Tengyu Ma. Transactions of the Association for Computational Linguistics (TACL) 2017.

Algorithms for learning and inference in Bayesian settings

- Beyond Log-concavity: Provable Guarantees for Sampling Multi-modal Distributions using Simulated Tempering Langevin Monte Carlo. With Rong Ge and Holden Lee. NIPS 2018
- Convergence Bounds for Langevin Diffusion via Differential Geometry. With Ankur Moitra. Manuscript 2018.
- Mean-field Approximation, Convex Hierarchies, and the Optimality of Correlation Rounding: A Unified Perspective. With Vishesh Jain and Frederic Koehler. Manuscript 2018.
- Provable Learning of Noisy-OR Networks. With Sanjeev Arora, Rong Ge, and Tengyu Ma. STOC 2017
- How to Calculate Partition Functions using Convex Programming Hierarchies: Provable Bounds for Variational Methods. COLT 2016, Long talk.
- On Some Provably Correct Cases of Variational Inference for Topic Models. With Pranjal Awasthi. NIPS 2015, Spotlight

Teaching

- Instructor for 18.200A (Introduction to Discrete and Applied Mathematics) at MIT: Fall 2017/18 and Fall 2018/19.
- Teaching assistant for COS445 (Networks, Economics and Computing) at Princeton University: Spring 2014
- Teaching assistant for COS451 (Computational Geometry) at Princeton University: Fall 2013/14
- Grader for COS433 (Cryptography) at Princeton University: Fall 2011/12

Selected talks

- Beyond Log-concavity: Provable Guarantees for Sampling Multi-modal Distributions using Simulated Tempering Langevin Monte Carlo (MIT Algorithms and Complexity Seminar, 2017)
- Provable algorithms for learning noisy-OR networks (STOC 2017)
- New Techniques for Learning and Inference in Probabilistic Graphical Models (MIT Stochastics and Statistics Seminar, 2017; Microsoft Research Redmond, 2017)
- How to Calculate Partition Functions Using Convex Programming Hierarchies: provable bounds for variational methods (Stanford Theory Seminar, 2017; Los Alamos National Laboratory, 2016; Rutgers University, 2016; COLT, 2016)
- On Some Provably Correct Cases of Variational Inference for Topic Models (NIPS, 2015)