

Niladri S. Chatterji

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Research interests

Statistical Learning Theory, Generalization of Interpolating Models, Online Learning & Markov chain Monte Carlo methods.

Work Experience

Postdoctoral Fellow

June 2021 - Present

Department of Computer Science, Stanford University

Advisors - [Percy Liang](#) and [Tatsunori Hashimoto](#)

Education

PhD in Physics

August 2015 - May 2021

Advisors - [Peter L. Bartlett](#) and [Michael DeWeese](#)

University of California, Berkeley

Dual Degree (B.Tech + M.Tech) in Engineering Physics

June 2010 - July 2015

Minor in Electrical Engineering

Indian Institute of Technology Bombay

GPA: 9.40/10.00, Department Rank 1

Publications and pre-prints

In Computer Science and Statistics

- Undersampling is a Minimax Optimal Robustness Intervention in Nonparametric Classification
Niladri S. Chatterji*, Saminul Haque*, Tatsunori Hashimoto; *arXiv preprint 2022*.
- Random Feature Amplification: Feature Learning and Generalization in Neural Networks
Spencer Frei, Niladri S. Chatterji, Peter L. Bartlett; *arXiv preprint 2022*.
- Benign Overfitting without Linearity: Neural Network Classifiers Trained by Gradient Descent for Noisy Linear Data
Spencer Frei, Niladri S. Chatterji, Peter L. Bartlett; *COLT 2022*.
- Is Importance Weighting Incompatible with Interpolating Classifiers?
Ke Alexander Wang*, Niladri S. Chatterji*, Saminul Haque, Tatsunori Hashimoto; *ICLR 2022*.
- Foolish crowds support benign overfitting
Niladri S. Chatterji, Philip M. Long; *Journal of Machine Learning Research 2022*.
- The interplay between implicit bias and benign overfitting in two-layer linear networks
Niladri S. Chatterji, Philip M. Long, Peter L. Bartlett; *Journal of Machine Learning Research 2022*.
- On the Opportunities and Risks of Foundation Models
Rishi Bommasani, ..., Niladri S. Chatterji, ..., Percy Liang; *arXiv preprint 2021*.
- On the theory of reinforcement learning with once-per-episode feedback
Niladri S. Chatterji, Aldo Pacchiano, Peter L. Bartlett, Michael I. Jordan; *NeurIPS 2021*.
- When does gradient descent with logistic loss interpolate using deep networks with smoothed ReLU activations?
Niladri S. Chatterji, Philip M. Long, Peter L. Bartlett; *COLT 2021*.
- When does gradient descent with logistic loss find interpolating two-layer networks?
Niladri S. Chatterji, Philip M. Long, Peter L. Bartlett; *Journal of Machine Learning Research 2021*.
- Finite-sample analysis of interpolating linear classifiers in the overparameterized regime
Niladri S. Chatterji, Philip M. Long; *Journal of Machine Learning Research 2021*.

- Oracle lower bounds for stochastic gradient sampling algorithms
Niladri S. Chatterji, Peter L. Bartlett, Philip M. Long; *Bernoulli* 2022
- The intriguing role of module criticality in the generalization of deep networks
Niladri S. Chatterji, Behnam Neyshabur, Hanie Sedghi; *ICLR 2020* (spotlight talk).
- OSOM: A simultaneously optimal algorithm for multi-armed and linear contextual bandits
Niladri S. Chatterji, Vidya Muthukumar and Peter L. Bartlett; *AISTATS 2020*.
- Langevin Monte Carlo without smoothness
Niladri S. Chatterji*, Jelena Diakonikolas*, Michael I. Jordan and Peter L. Bartlett; *AISTATS 2020*.
- Is there an analog of Nesterov acceleration for MCMC?
Yi-An Ma, Niladri S. Chatterji, Xiang Cheng, Nicolas Flammarion, Peter L. Bartlett and Michael Jordan; *Bernoulli* 2021.
- Sharp convergence rates for Langevin dynamics in the nonconvex setting
Xiang Cheng, Niladri S. Chatterji, Yasin Abbasi-Yadkori, Peter L. Bartlett and Michael I. Jordan; *arXiv preprint*.
- Online learning with kernel losses
Niladri S. Chatterji*, Aldo Pacchiano*, Peter Bartlett; *ICML 2019* (long talk).
- On the theory of variance reduction for stochastic gradient Monte Carlo
Niladri S. Chatterji, Nicolas Flammarion, Yi-An Ma, Peter L. Bartlett, Michael I. Jordan; *ICML 2018*.
- Underdamped Langevin MCMC: A non-asymptotic analysis
Xiang Cheng*, Niladri S. Chatterji*, Peter L. Bartlett, Michael I. Jordan; *COLT 2018*.
- Alternating minimization for dictionary learning: Local convergence guarantees
Niladri S. Chatterji, Peter L. Bartlett; *NIPS 2017*.

In Physics

- Proposal for a spin-transfer torque device based on resonant tunneling
Niladri S. Chatterji, A. Tulapurkar and B. Muralidharan (APS March Meeting, 2015)
- Nanoscale-Magneto-resistance sensors with enhanced sensitivity using resonant tunneling magnetic junctions - Niladri S. Chatterji, A. Sharma, A. Tulapurkar and B. Muralidharan, Proceedings of SSDM, Sapporo, Japan, (2015).
- Enhancement of Spin-transfer torque switching via resonant tunneling
Niladri S. Chatterji, A. Tulapurkar and B. Muralidharan. Applied Physics Letters Vol 105 Issue 25, 232410 (2014).
- N. Chatterji, A. Tulapurkar, B. Muralidharan. Resonant tunneling magnetic tunnel junction device. Indian Patent Application No. 3717/MUM/2014, filed November 2014. Patent Pending.

Awards

1. Stanford SAIL Postdoctoral Fellowship, 2021.
2. Simons Berkeley Research Fellowship, 2021 (declined).

Talks

1. The interplay between interpolation and robustness. Simons Institute Deep Learning Theory Workshop and Summer School 2022.
2. Two Vignettes about Interpolation and Generalization. Stanford Information Systems Laboratory Colloquium 2022.
3. Two Vignettes about Interpolation and Generalization. Google Algorithms Seminar 2022.
4. Foolish Crowds Support Benign Overfitting: Lower Bounds for Sparse Interpolators. Stanford ML Lunch 2022.
5. Is Importance Weighting Incompatible with Interpolating Classifiers? Stanford ML Lunch 2021.

6. Benign Overfitting: Beyond the Ordinary Least Squares. EPFL ML Reading Group 2021.
7. When does gradient descent find interpolating neural network classifiers? – Harvard Probabilis Seminar 2021.
8. When does gradient descent find interpolating neural network classifiers? – UCLA Big Data and Machine Learning Seminar 2021.
9. When does gradient descent find interpolating neural network classifiers? – NSF-Simons Mathematics of Deep Learning Journal Club 2021.
10. Upper and lower bounds for gradient based sampling methods – Math Machine Learning Seminar MPI MIS + UCLA 2020.
11. The intriguing role of module criticality in the generalization of deep networks – Google Brain 2019.
12. Analysis of Markov Chain Monte Carlo Algorithms – Berkeley AI Retreat 2019.
13. Underdamped Langevin Markov Chain Monte Carlo – Simons Industry Day 2019.
14. Underdamped Langevin Markov Chain Monte Carlo – Simons Program on Foundations of Data Science Fall 2018.
15. Underdamped Langevin Markov Chain Monte Carlo – Midwest Machine Learning Symposium 2018.
16. Alternating minimization for dictionary learning: Local Convergence Guarantees – Berkeley AI Seminar 2017.

Advanced courses completed

EECS: Randomness and computation (Alistair Sinclair), Deep reinforcement learning (Sergey Levine), Machine learning in social dynamics (Moritz Hardt), Beyond worst case analysis (Luca Trevisan), Convex optimization (Ben Recht), Game theory (Ankur Kulkarni), Complexity theory (Prasad Raghavendra), Information theory (Thomas Courtrade)

Statistics: Theoretical Statistics (Michael Jordan), High dimensional Statistics (Martin Wainwright), Statistical Learning Theory (Peter L. Bartlett), Probability Theory (Jim Pitman and Steven Evans)

Academic Achievements

- *Ranked 1st* among the students in the dual degree programme in Engineering Physics at IIT Bombay.
- Institute Academic Prizes: Awarded scholarships for Ranking 1st in my second, third and fourth year at IIT Bombay.

Teaching Experience

I thoroughly enjoy teaching and have been a tutor for over 400 students. My duties included solving doubts in the subject matter, helping students develop problem solving skills and grading examination papers.

- TA for graduate course on Linear models at UC Berkeley Spring 2020
- TA for undergraduate course on Electricity and Magnetism at UC Berkeley Spring 2017 & Fall 2016
- TA for Physics 7B at UC Berkeley Fall 2015, Spring & Summer 2016
- TA for UG laboratory, Basic Electronics at IIT Bombay Autumn 2014
- TA for UG course, Electricity and Magnetism at IIT Bombay Spring 2013
- TA for UG course, Quantum Physics at IIT Bombay Autumn 2013
- TA for UG course, Intro to Numerical Analysis at IIT Bombay Summer 2012

Academic Service

Conference Reviews : NeurIPS (2018, 2019, 2020, 2021), ICML (2020, 2021, 2022), COLT (2018, 2019, 2020, 2021, 2022), AISTATS (2019, 2020), ALT (2018, 2021), L4DC (2020, 2021)

Journal Reviews: Journal of Machine Learning Research, Bernoulli, Annals of Applied Probability, Annales de l'Institut Henri Poincaré (B) Probabilités et Statistiques, SIAM Journal on the Mathematics of Data Science.