

## Naman Agarwal

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CONTACT INFORMATION	Senior Research Scientist Google Research, Princeton Princeton, NJ 08540 USA	<i>Mobile:</i> +1-217-418-9266 <i>E-mail:</i> <a href="mailto:naman33k@gmail.com">naman33k@gmail.com</a> <a href="http://naman33k.github.io">http://naman33k.github.io</a>
RESEARCH INTERESTS	Optimization for Machine Learning, Decision Making and Control, Privacy for Machine Learning and Data Analysis.	
EDUCATION	<p><b>Princeton University</b>, Princeton, NJ, USA Doctor of Philosophy(PhD) in <a href="#">Computer Science</a></p> <ul style="list-style-type: none"><li>• GPA: <i>3.95/4.00</i></li><li>• Advisor: <a href="#">Dr. Elad Hazan</a></li><li>• Thesis: Second-Order Optimization Methods for Machine Learning</li></ul> <p><b>University of Illinois Urbana-Champaign</b>, Urbana, IL, USA Master of Science in <a href="#">Computer Science</a>, May 2014</p> <ul style="list-style-type: none"><li>• GPA : <i>3.96/4.00</i></li><li>• Advisor: <a href="#">Dr. Alexandra Kolla</a></li><li>• Masters Thesis: Unique Games Conjecture: the Boolean Hypercube and connections to graph lifts</li></ul> <p><b>IIT Bombay</b>, Mumbai, India Bachelor of Technology in <a href="#">Computer Science and Engineering</a>, August 2012</p> <ul style="list-style-type: none"><li>• GPA : <i>9.48/10.00</i></li><li>• Advisor: <a href="#">Dr. Abhiram G. Ranade</a></li><li>• Bachelor Thesis: Convergence Analysis of Newton's Method in Draw-CAD</li></ul>	
WORK/RESEARCH EXPERIENCE	<p><b>Senior Research Scientist</b>, <i>Google Research, Princeton</i> 2018-ongoing</p> <p><b>Research Internship</b>, <i>BigML Team, Google Research NYC</i> <i>Privacy and Communication in Large Scale Distributed Machine Learning</i> Summer 2017</p> <p><b>Research Assistantship</b>, <i>supervised by Dr. Elad Hazan</i> <i>Second Order Methods for Optimization in Machine Learning</i> 2015- ongoing</p> <p><b>Research Internship</b>, <i>supervised by Dr. Nikhil Srivastava, Microsoft Research, Bangalore</i> <i>Optimization Approaches for Faster Graph Sparsification</i> Summer 2014</p> <p><b>Research Assistantship</b>, <i>supervised by Dr. Alexandra Kolla, University of Illinois Urbana-Champaign</i> <i>Spectral Graph Theory and Stochastic Networks</i> 2012-2014</p> <p><b>Research Internship</b>, <i>supervised by Dr. Ranjita Bhagwan, Microsoft Research, Bangalore</i> <i>Algorithms for Automated Data Center Design</i> Summer 2011</p> <p><b>Research Internship</b>, <i>supervised by Dr. Stefan Schwoon, LSV, ENS-Cachan</i> Summer 2010</p>	
PUBLICATIONS	<ul style="list-style-type: none"><li>• <b>Online Target Q-learning with Reverse Experience Replay: Efficiently finding the Optimal Policy for Linear MDPs</b> <i>Naman Agarwal, Syomantak Chaudhari, Prateek Jain, Dheeraj Mysore Nagaraj, Praneeth</i></li></ul>	

*Netrapalli*

International Conference for Learning Representations(ICLR), 2022

Arxiv Link: <https://arxiv.org/abs/2110.08440>

- **Efficient Methods for Online Multiclass Logistic Regression**

*Naman Agarwal, Satyen Kale, Julian Zimmert*

International Conference on Algorithmic Learning Theory(ALT), 2022

Arxiv Link: <https://arxiv.org/abs/2110.03020>

- **The Skellam Mechanism for Differentially Private Federated Learning**

*Naman Agarwal, Peter Kairouz and Ken Ziyu Liu*

Conference on Neural Information Processing Systems(NeurIPS), 2021

Arxiv Link: <https://arxiv.org/abs/2110.04995>

- **Machine Learning for Mechanical Ventilation Control**

*Daniel Suo, Naman Agarwal, Wenhan Xia, Xinyi Chen, Udaya Ghai, Alexander Yu, Paula Gradu, Karan Singh, Cyril Zhang, Edgar Minasyan, Julianne LaChance, Tom Zajdel, Manuel Schottendorf, Daniel Cohen and Elad Hazan*

Extended Abstract - Machine Learning for Health (ML4H), 2021

Arxiv Link: <https://arxiv.org/abs/2102.06779>, Code: Github, Press: Princeton, Google AI Blog

- **A Regret Minimization Approach to Iterative Learning Control**

*Naman Agarwal, Elad Hazan, Aniruddha Majumdar and Karan Singh*

International Conference on Machine Learning (ICML), 2021

Arxiv Link: <https://arxiv.org/abs/2102.13478>

- **Acceleration via Fractal Learning Rate Schedules**

*Naman Agarwal, Surbhi Goel and Cyril Zhang*

International Conference on Machine Learning (ICML), 2021

Arxiv Link: <https://arxiv.org/abs/2103.01338>

- **Deluca – A Differentiable Control Library: Environments, Methods, and Benchmarking**

*Paula Gradu, John Hallman, Daniel Suo, Alex Yu, Naman Agarwal, Udaya Ghai, Karan Singh, Cyril Zhang, Aniruddha Majumdar, Elad Hazan*

Neurips 2020 Workshop on Differentiable computer vision, graphics and physics in machine learning

Arxiv Link: <https://arxiv.org/abs/2102.09968>

- **A Deep Conditioning Treatment of Neural Networks**

*Naman Agarwal, Pranjal Awasthi, Satyen Kale*

International Conference on Algorithmic Learning Theory(ALT), 2021

Arxiv Link: <https://arxiv.org/abs/2002.01523>

- **Stochastic Optimization with Laggard Data Pipelines**

*Naman Agarwal, Rohan Anil, Tomer Koren, Kunal Talwar, Cyril Zhang*

International Conference on Machine Learning (ICML), 2020

Arxiv Link: <https://arxiv.org/abs/2010.13639>

- **Boosting for Dynamical Systems**

*Naman Agarwal, Nataly Brukhim, Elad Hazan, Zhou Lu*

Conference on Neural Information Processing Systems(NeurIPS), 2020

Arxiv Link: <https://arxiv.org/abs/1906.08720>

- **Adaptive regularization with cubics on manifolds**

*Naman Agarwal, Nicolas Boumal, Brian Bullins, Coralia Cartis*

Mathematical Programming, 2020

Arxiv Link: <https://arxiv.org/abs/1806.00065>

- **Extreme Tensoring for Low-Memory Preconditioning**  
Xinyi Chen, Naman Agarwal, Elad Hazan, Cyril Zhang, Yi Zhang  
International Conference for Learning Representations (ICLR), 2020  
Arxiv Link: <https://arxiv.org/abs/1902.04620>
- **Leverage Score Sampling for Faster Accelerated Regression and ERM**  
Naman Agarwal, Sham Kakade, Rahul Kidambi, Praneeth Nethrapalli, Aaron Sidford, Yin Tat-Lee  
Conference on Algorithmic Learning Theory (ALT), 2020  
Arxiv Link: <https://arxiv.org/abs/1711.08426>
- **Logarithmic Regret for Online Control**  
Naman Agarwal, Elad Hazan, Karan Singh  
**Oral Presentation** Conference on Neural Information Processing Systems(NeurIPS), 2019  
Arxiv Link: <https://arxiv.org/abs/1902.08721>
- **Learning in Non-convex Games with an Optimization Oracle**  
Naman Agarwal, Alon Gonen, Elad Hazan  
Conference on Learning Theory(COLT), 2019  
Arxiv Link: <https://arxiv.org/abs/1810.07362>
- **Online Control with Adversarial Disturbances**  
Naman Agarwal, Brian Bullins, Elad Hazan, Sham Kakade, Karan Singh  
International Conference on Machine Learning(ICML), 2019  
Arxiv Link: <https://arxiv.org/abs/1902.08721>
- **The Case for Full-Matrix Adaptive Regularization**  
Naman Agarwal, Brian Bullins, Xinyi Chen, Elad Hazan, Karan Singh, Cyril Zhang, Yi Zhang  
International Conference on Machine Learning(ICML), 2019  
Arxiv Link: <https://arxiv.org/pdf/1806.02958.pdf>
- **cpSGD: Communication-efficient and differentially-private distributed SGD**  
Naman Agarwal, Ananda Theertha Suresh, Felix Yu, Sanjiv Kumar, Brendan McMahan  
**Spotlight**, Neural Information Processing Systems, 2018  
Arxiv Link: <https://arxiv.org/abs/1805.10559>
- **Lower Bounds for Higher-Order Convex Optimization**  
Naman Agarwal, Elad Hazan  
Conference on Learning Theory(COLT), 2018  
Arxiv Link: <https://arxiv.org/pdf/1710.10329.pdf>
- **The Price of Differential Privacy For Online Learning**  
Naman Agarwal, Karan Singh  
International Conference on Machine Learning(ICML), 2017  
Arxiv Link: <https://arxiv.org/abs/1701.07953>
- **Finding Approximate Local Minima for Nonconvex Optimization in Linear Time**  
Naman Agarwal, Zeyuan Allen-Zhu, Brian Bullins, Elad Hazan, Tengyu Ma  
Symposium on Theory of Computing (STOC) 2017  
Arxiv link : <https://arxiv.org/abs/1611.01146>
- **Second Order Stochastic Optimization in Linear Time**  
Naman Agarwal, Brian Bullins, Elad Hazan  
Journal of Machine Learning Research (JMLR)  
Arxiv link : <https://arxiv.org/abs/1602.03943>  
Preliminary results presented at the Optimization Methods for the Next Generation of Machine Learning workshop - ICML 2016  
Awarded Honorable Mention for the 2018 Student Paper Prize Competition of the INFORMS Optimization Society

- **On the Expansion of Group-Based Lifts**

*Naman Agarwal, Karthekeyan Chandrasekaran, Alexandra Kolla, Vivek Madan*

SIAM Journal on Discrete Mathematics, Volume 33, Issue 3

21<sup>st</sup> International Workshop on Randomization and Computation (RANDOM) 2017

Arxiv link : <http://arxiv.org/abs/1311.3268>

- **Multisection in the Stochastic Block Model using Semidefinite Programming**

*Naman Agarwal, Afonso Bandeira, Konstantinos Koiliaris, Alexandra Kolla*

To appear in Compressed Sensing and Its Applications: Second International MATHEON Conference, 2015

Arxiv link : <http://arxiv.org/abs/1507.02323>

- **Unique Games on the Hypercube**

*Naman Agarwal, Guy Kindler, Alexandra Kolla, Luca Trevisan*

Chicago Journal of Theoretical Computer Science

Link : <http://cjtc.cs.uchicago.edu/articles/2015/1/contents.html>

#### ACADEMIC ACHIEVEMENTS

- Awarded Best Paper at the Neurips 2019 Optimization for Reinforcement Learning Workshop.
- Awarded the 2018 Student Paper Prize Competition of the INFORMS Optimization Society, Honorable Mention.
- Selected to receive the Chirag Foundation Graduate Fellowship in Computer Science awarded by the Computer Science Department at University of Illinois Urbana-Champaign.
- Awarded the Student Travel Award to attend the conferences STOC-2013 and CCC-2013.
- Secured an All India Rank 64 in IITJEE 2008 among 300,000 students.
- Secured an All India Rank of 148 in AIEEE 2008 among 8,00,000 students
- Awarded the CBSE Merit Scholarship on the basis of my performance in AIEEE

#### PROFESSIONAL SERVICE

- Program Committee Member - ALT 2019, 2021 COLT 2020, 2021.
- Area Chair - Neurips 2020, ICLR 2020.
- Reviewer for multiple editions of ICLR, NIPS, ICML, COLT, Journal of Machine Learning Research, Mathematical Programming, Theory of Computing.

#### TEACHING EXPERIENCE

- Teaching Assistant, CS 423 : Theory of Algorithms – Spring 2016, Princeton University
- Teaching Assistant, CS 402 : Artificial Intelligence – Fall 2015, Princeton University
- Teaching Assistant, CS 461 : Computer Security – Fall 2012, UIUC
- Teaching Assistant, CS 420 : Graph Theory – Spring 2012, IIT Bombay

#### PROGRAMMING SKILLS

- Deep Learning in TensorFlow, Python
- Java, C++, MATLAB