

Sudeep Salgia

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Research Interests

My research focuses on **provably efficient** and **resource-aware data-driven decision-making** in sequential learning problems arising in reinforcement learning, stochastic optimization, distributed learning, bandits, and active online learning. My research agenda has two main thrusts:

- Establish lower bound on feasible performance and characterize the trade-off between learning efficiency and practical and systemic constraints;
- Design provably optimal algorithms for real-world applications that offer practical qualitative benefits such as adaptivity and interpretability.

My research employs tools from high-dimensional statistics, probability theory, large-scale optimization, information theory and machine learning and offers a unique perspective into decision making that is based on a blend of information-theoretic, statistical, and systemic design aspects .

Professional Experience

- 09.23 - Pre **Carnegie Mellon University**
Postdoctoral Research Associate, Electrical and Computer Engineering
Supervisor: Prof. Yuejie Chi
- 05.21-08.21 **Machine Learning Solutions Lab, Amazon, Applied Scientist Intern**
Identifying and building ML solutions to address business problems of clients
Hosted by Daniel Horowitz and Emmanuel Salawu

Education

- 2018-23 **Cornell University.**
Ph.D., Electrical and Computer Engineering (CGPA 4.18/4.0)
Advisor: Prof. Qing Zhao
- 2014-18 **Indian Institute of Technology Bombay.**
Bachelor of Technology in Electrical Engineering (with Honors), Minor in CS
Institute Silver Medalist, CGPA 9.74/10

Conference Publications

1. The Sample-Communication Complexity Trade-off in Federated Q-Learning [[Paper](#)]
Sudeep Salgia, Yuejie Chi
Neural Information Processing Systems (NeurIPS), 2024. **Oral Presentation (top 1% of accepted papers).**
2. Random Exploration in Bayesian Optimization: Order-Optimal Regret and Computational Efficiency [[Paper](#)]
Sudeep Salgia, Sattar Vakili, Qing Zhao
International Conference on Machine Learning (ICML), 2024. **Resolves an open COLT problem.**

3. Characterizing the Accuracy-Communication-Privacy Trade-off in Distributed Stochastic Convex Optimization
Sudeep Salgia, Nikola Pavlovic, Yuejie Chi, Qing Zhao
Submitted to International Conference on Artificial Intelligence and Statistics (AISTATS), 2025
4. Order-Optimal Regret in Distributed Kernel Bandits using Uniform Sampling with Shared Randomness [[Preprint](#)]
 Nikola Pavlovic, **Sudeep Salgia**, Qing Zhao
 Preliminary version in NeurIPS BDU Workshop, 2024
Submitted to International Conference on Artificial Intelligence and Statistics (AISTATS), 2025
5. Differentially Private Kernelized Contextual Bandits
 Nikola Pavlovic, **Sudeep Salgia**, Qing Zhao
Submitted to International Conference on Artificial Intelligence and Statistics (AISTATS), 2025
6. Distributed Linear Bandits under Communication Constraints [[Paper](#)]
Sudeep Salgia, Qing Zhao
 International Conference on Machine Learning (ICML), 2023
7. Provably and Practically Efficient Neural Contextual Bandits [[Paper](#)]
Sudeep Salgia, Sattar Vakili, Qing Zhao
 International Conference on Machine Learning (ICML), 2023
8. A Domain-Shrinking based Bayesian Optimization Algorithm with Order-Optimal Regret Performance [[Paper](#)]
Sudeep Salgia, Sattar Vakili, Qing Zhao
 Neural Information Processing Systems (NeurIPS), 2021
9. An order-optimal adaptive test plan for noisy group testing under unknown noise models [[Paper](#)]
Sudeep Salgia, Qing Zhao
 International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2021
10. Stochastic Coordinate Minimization with Progressive Precision for Stochastic Convex Optimization [[Paper](#)]
Sudeep Salgia, Qing Zhao, Sattar Vakili
 International Conference on Machine Learning (ICML), 2020
11. Stochastic Gradient Descent on a Tree: an Adaptive and Robust Approach to Stochastic Convex Optimization [[Paper](#)]
 Sattar Vakili, **Sudeep Salgia**, Qing Zhao
 Annual Allerton Conference on Communication, Control and Computing, 2019
12. On Bandlimited Spatiotemporal Field Sampling with Location and Time Unaware Mobile Sensors [[Paper](#)]
Sudeep Salgia, Animesh Kumar
 International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2018

Journal Publications

1. Adaptive Binning Coincidence Test for Uniformity Testing [[Paper](#)]
Sudeep Salgia, Xinyi Wang, Qing Zhao, Lang Tong
 IEEE Transactions on Signal Processing, 2024
2. A Communication-Efficient Adaptive Algorithm for Federated Learning under Cumulative Regret [[Paper](#)]
Sudeep Salgia, Tamir Gabay, Qing Zhao, Kobi Cohen
 IEEE Transactions on Signal Processing, 2024

3. Collaborative Learning in Kernel-based Bandits for Distributed Users [[Paper](#)]
Sudeep Salgia, Sattar Vakili, Qing Zhao
 IEEE Transactions on Signal Processing, 2023
4. A perspective on data sharing in digital food safety systems [[Paper](#)]
 Chenhao Qian, Yuhao Liu, Cecil Barnett-Neefs, **Sudeep Salgia**, Omer Serbetci, Aaron Adalja, Jayadev Acharya, Qing Zhao, Renata Ivanek, Martin Wiedmann
 Critical Reviews in Food Science and Nutrition, 2023
5. Disagreement-based Active Learning in Online Settings [[Paper](#)]
 Boshuang Huang, **Sudeep Salgia**, Qing Zhao
 IEEE Transactions on Signal Processing, 2022

Invited Talks

- 12.24 The Sample-Communication Complexity Trade-off in Federated Q-Learning
Neural Information Processing Systems (NeurIPS), Oral presentation
- 09.24 The Sample-Communication Complexity Trade-off in Federated Q-Learning
Allerton Conference, UIUC

Teaching and Community involvement

Teaching **Teaching Assistant.**

- Statistical Inference and Decision, Introduction to Probability (*Cornell University*)
- Linear Algebra, Electromagnetism (*IIT Bombay*)

Reviewing Reviewer for ICML (2021-24), NeurIPS (2021-24, in top 10% of reviewers in 22-23), AISTATS (2022-25), ICLR (2023, 2025), IJCAI (2024), ISIT (2023-24), AAAI (2025), IEEE/ACM Transactions on Networking, IEEE Transactions on Information Theory, IEEE Transactions on Signal Processing

Volunteer **Abhyasika, IIT Bombay.**

- Abhyasika is an initiative that runs tutorials for underprivileged children and supports them in their education

Mentorship

- 12.23 - Pre Nikola Pavlovic, PhD Student, Cornell University
- 06.24 - Pre Tonghe Zhang, Visting UG student, Tsinghua University
- 05.22 - 04.23 Tamir Gabay, Masters student, Ben-Gurion University of the Negev
- 08.22 - 12.22 Danyu Hu, Masters student, Cornell University (Curr. Quantitative Analyst)
- 08.22 - 12.22 Owen Deng, Masters student, Cornell University (Curr. Design Verification Engineer at Apple)
- 08.21 - 02.22 Omer Serbetci, Masters student, Cornell University (Curr. PhD student at USC)
- 2017-18 **Department Academic Mentor, IIT Bombay.**
- Selected as one of 22 students based on interpersonal skills and academic performance to mentor students with academic backlog and help them address concomitant social problems

Scholastic Achievements and Awards

- 2018 Awarded Jacobs Scholar Fellowship at Cornell University
- 2018 Silver Medalist in the Class of 2018, IIT Bombay

- 2014 Secured All India Rank 214 in JEE Advanced 2014 among 150,000 selected candidates from over all India
- 2017 Selected for the final round of Honda YES Scholarship, among top 20 students in India on the basis of views on and contribution to eco-technology
- 2015 Best Application Award for our project on Sign Language to Text Converter at the Tech & RnD Expo, IIT Bombay
- 2005-2012 Stood among Top 100 in India in various Math, Science and Cyber Olympiads

Co-Curricular Activities

- Member of the Cornell Cricket Team
- Amongst top active contributors at [Math StackExchange](#) (top 5% in 2023)
- Secured sixth position in a global Creative Writing competition in Mood Indigo 2014 - the cultural fest of IIT Bombay
- Was a Moderator at [Brilliant.org](#), a community based platform for development of skills in Math and Science for international competitive exams, for two years
- Articles published in various print media (English and Hindi)
- Hobbies: Painting, Sketching, Badminton, Cricket

References

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Cornell University
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