

ROHAN DEB

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Interests: Reinforcement Learning, Bandits, Optimization, Active Learning, Deep Learning

EDUCATION

Doctorate of Philosophy <i>Major: Computer Science</i> <i>MS in Mathematics (ongoing)</i> <i>Graduate Minor in Statistics (ongoing)</i> University of Illinois, Urbana-Champaign Advisor: Arindam Banerjee GPA: 3.97/4	Aug 2022 - now Urbana-Champaign, IL, USA
Master of Technology <i>Major: Computer Science</i> Indian Institute of Science, Bangalore Advisor: Shalabh Bhatnagar GPA: 9.5/10	Aug. 2019 – May 2021 Bangalore, KA, India
Bachelor of Technology <i>Major: Computer Science</i> National Institute of Technology, Silchar GPA: 9.38/10	Aug. 2015 – May 2019 Silchar, India

WORK EXPERIENCE

Applied Science Intern Amazon, AWS-AI Lab Advisor: Branislav Kveton	May 2024 – Aug 2024 San Jose, CA, USA
Research Assistant University of Illinois, Urbana-Champaign Advisor: Arindam Banerjee	Aug 2022 – July 2023 Urbana-Champaign, IL, USA
Project Associate Indian Institute of Science, Bangalore Advisor: Gugan Thoppe	Aug 2021 – July 2022 Bangalore, KA, India
Research Intern Indian Institute of Technology, Madras Advisor: Kamakoti Veezhinathan	May 2017 – July 2017 Chennai, TN, India

PUBLICATIONS/PRE-PRINTS (*EQUAL CONTRIBUTION)

- **Conservative Contextual Bandits: Beyond Linear Representations.**
[Rohan Deb](#), Mohammad Ghavamzadeh, Arindam Banerjee
Under Submission at 13th International Conference on Learning Representations (ICLR), 2025
- **Contextual Bandits with Online Neural Regression.**
[Rohan Deb](#), Yikun Ban, Shiliang Zuo, Jingrui He, Arindam Banerjee
Accepted at 12th International Conference on Learning Representations (ICLR), 2024 | [arxiv](#) | [openreview](#)

- **Think Before You Duel: Understanding Complexities of Preference Learning under Constrained Resources.**
Rohan Deb, Aadirupa Saha, Arindam Banerjee
Accepted at 27th International Conference on Artificial Intelligence and Statistics (AISTATS), 2024 | [arxiv](#)
- **Gradient Temporal Difference with Momentum: Stability and Convergence.**
Rohan Deb, Shalabh Bhatnagar
Accepted at 36th AAAI Conference on Artificial Intelligence, 2022 | [arxiv](#) | [AAAI](#)
- **Does Momentum Help in Stochastic Optimization? A sample complexity Analysis.**
Swetha Ganesh*, **Rohan Deb***, Gagan Thoppe, Amarjit Buddhiraja
Accepted at 39th Conference on Uncertainty in Artificial Intelligence (UAI), 2023 | [UAI](#) | [arxiv](#)
- **Schedule Based Temporal Difference Algorithms.**
Rohan Deb*, Meet Gandhi*, Shalabh Bhatnagar
Accepted at 58th Annual Allerton Conference on Communication, Control, and Computing, 2022 | [IEEE](#) | [arxiv](#)
- **N-Timescale Stochastic Approximation: Stability and Convergence.**
Rohan Deb, Shalabh Bhatnagar
Under Submission at Stochastic Systems | [arxiv](#)

CURRENT RESEARCH PROJECTS

Optimal Design for Large Language Models

Collaborators: [Branislav Kveton](#), [Kiran Koshy Thekumparampil](#)

- We try to improve the statistical efficiency of fine tuning by selecting an informative subset of training examples. The key idea in our method is to select examples that maximize the Hessian of the log-likelihood of the LLM. We approximate it efficiently based on making a connection to uncertainty modeling in multinomial logistic regression models.
- Our approach is computationally efficient, analyzable, and performs well empirically. We demonstrate this on several problems, and back our claims with both quantitative results and an LLM evaluation.

Black-box Metric Optimization for Pre-trained Models

Collaborators: [Gaurush Hiranandani](#)

- Given a pre-trained model and access to a black-box metric, our objective is to post-shift the model to optimize the given metric. Such models find applications in domain adaptation, fairness, distribution shift etc.
- Unlike previous work, we focus on cases where the metric could be an arbitrary function of the entries of the confusion matrix. Further we also plan on extending the setup to auto-regressive tasks with a focus on language modelling tasks.

Combinatorial Rotting Bandits

Collaborators: [Nicolò Cesa-Bianchi](#), [Aadirupa Saha](#)

- We introduce combinatorial rotting bandits, a new extension of combinatorial multi-armed bandits where rewards decay as arms are repeatedly chosen, and we propose an algorithm that combines linear bandit techniques with arm elimination from to tackle this challenge.

Neural Contextual Bandits with Random Sketching

Collaborators: [Arindam Banerjee](#)

- Existing bandit algorithms with neural networks are computationally inefficient and incur large regret owing to a huge number of parameters. We are focusing on using random sketching along with properties of hessian of the neural networks to obtain tighter regret guarantees along with faster algorithms.

Safety in Reinforcement Learning and Contextual Bandits

Collaborators: [Mohammad Ghavamzadeh](#), [Arindam Banerjee](#)

- We study bandit and reinforcement learning problems under different safety models. For the conservative bandit setup where the agent needs to maintain performance with respect to a baseline we prove sub-linear regret for general reward functions. We also provide first order regret bounds that significantly improve the performance.
- Subsequently we are focusing on other safety setups such as stage-wise constraints and knapsack budgeted constraints for general reinforcement learning problems.

TEACHING EXPERIENCE

Reinforcement Learning , Teaching Assistant University of Illinois, Urbana-Champaign	Jan 2024 – May 2024 Urbana-Champaign, IL, USA
Introduction to Data Mining , Teaching Assistant University of Illinois, Urbana-Champaign	Aug 2023 – Dec 2023 Urbana-Champaign, IL, USA
Reinforcement Learning , Teaching Assistant Indian Institute of Science, Bangalore	Jan 2022 – Apr 2022 Bangalore, KA, India
Measure Theoretic Probability , Teaching Assistant Indian Institute of Science, Bangalore	Jan 2022 – Apr 2022 Bangalore, KA, India
Topics in Stochastic Approximation Algorithms , Teaching Assistant Indian Institute of Science, Bangalore	Aug 2021 – Dec 2021 Bangalore, KA, India
Linear Algebra and Probability , Teaching Assistant Indian Institute of Science, Bangalore	Aug 2021 – Dec 2021 Bangalore, KA, India
Machine Learning , Instructor Innomatics Research Labs	Feb 2022 - July 2022 Hyderabad, TL, India
Introduction to Data Science , Instructor Technology for all	May 2021 - Aug2021 Hyderabad, TL, India

HONORS AND AWARDS

Computer Society of India Medal for Best Masters Student in Computer Science Indian Institute of Science, Bangalore	2022
Undergraduate Medal for highest GPA in Computer Science National Institute of Technology, Silchar	2020
All India Computer Science rank 52 GATE (Graduate Aptitude Test in Engineering)	2019

Summer Research Fellowship Programme

2017

Indian Academy of Sciences

Letter of appreciation for outstanding performance in High School exam.

2015

Ministry of Education

SELECTED COURSE WORK

Deep Generative and Dynamic models, Statistical Reinforcement Learning, Online Learning and Bandits, Deep Learning Theory, Stochastic Processes, Queuing Theory, Stochastic Approximation Algorithms, Machine Learning, Statistical Learning Theory, Pattern Recognition, Introduction to Robotics, Stochastic Calculus, High Dimensional Probability, Game Theory, Optimal Control

PROFESSIONAL SERVICE

- Co-Organizer, UIUC Machine Learning Seminar ([CS 591 MLR](#))
- Organizer, Reading Group: Optimal Transport, Spring 2024, UIUC ([Link](#))
- Organizer, Reading Group: Reinforcement Learning Theory, Winter 2023, UIUC ([Link](#))
- Organizer, Reading Group: High Dimensional Probability, Fall 2023, UIUC ([Link](#))
- Program Committee Member, 13th International Conference on Learning Representations, 2025
- Reviewer, 27th International Conference on Artificial Intelligence and Statistics (AISTATS), 2024, 2025
- Program Committee Member, 37th AAAI Conference on Artificial Intelligence, 2023, 2024, 2025
- Reviewer, European Control Conference (ECC), 2024
- Reviewer, IEEE Transactions on Automatic Control
- Reviewer, IEEE Control Systems Letters