ROHAN DEB

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Homepage | Google Scholar | Linkedin

Interests: Bandits, Deep Learning, Sequential Decision Making, Reinforcement Learning, Optimization

EDUCATION

Doctorate of Philosophy | *Major: Computer Science*   Aug 2022 - now
Graduate Minor in Statistics (ongoing)
University of Illinois, Urbana-Champaign   Urbana-Champaign, IL, USA
Advisor: Arindam Banerjee
GPA: 3.96/4

Master of Technology | *Major: Computer Science*   Aug. 2019 – May 2021
Indian Institute of Science, Bangalore   Bangalore, KA, India
Advisor: Shalabh Bhatnagar
GPA: 9.5/10

Bachelor of Technology | *Major: Computer Science*   Aug. 2015 – May 2019
National Institute of Technology, Silchar   Silchar, India
GPA: 9.38/10

WORK EXPERIENCE

Research Assistant   Aug 2022 – July 2023
University of Illinois, Urbana-Champaign   Urbana-Champaign, IL, USA
Advisor: Arindam Banerjee

Project Associate   Aug 2021 – July 2022
Indian Institute of Science, Bangalore   Bangalore, KA, India
Advisor: Gugan Thoppe

Research Intern   May 2017 – July 2017
Indian Institute of Technology, Madras   Chennai,TN, India
Advisor: Kamakoti Veezhinathan

PUBLICATIONS/PRE-PRINTS (*EQUAL CONTRIBUTION)

- **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 | arxiv
  *Accepted at 27th International Conference on Artificial Intelligence and Statistics **(AISTATS)**, 2024*

- **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*, Gugan 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 | arxiv

CURRENT RESEARCH PROJECTS

Contextual Bandits with Online Neural Regression

Collaborators: Arindam Banerjee, Jingrui He, Yikun Ban, Shiliang Zuo

- We explicitly show that existing neural bandit algorithms like Neural-UCB and Neural-TS have $\Omega(T)$ regret.

- We provide provable sub-linear regret bounds for Neural Contextual bandits with wide networks by developing a novel result that uses the Quadratic Growth (QG) condition to give $\mathcal{O}(\log T)$ regret for online regression and use existing reduction to contextual bandits.

Dueling Bandits under Resource Constraints

Collaborators: Aadirupa Saha

- We formulate the preference based bandit learning framework under resource constraints and provide lower bound results to characterize when the problem is learnable.

- We further provide an EXP3 based algorithm combining both the preference of an arm and the associated consumption and provide sub-linear regret bounds.

Neural Contextual Bandits under changing distributions

Collaborators: Han Zhao, Ilan Shomorony, Arindam Banerjee, Seiyun Shin

- A recent work in Neural Contextual bandit (EE-Net) provided a sub-linear regret bound that is independent of of the number of parameters (or effective dimension of NTK) but assumes the contexts are i.i.d.

- We are currently studying the setting where the distribution of context changes with time. Our objective is to develop models that are useful in the real world and still gurantees a sub-linear regret without a dependence on the number of parameters.

Smooth Adversarial Neural Bandits

Collaborators: Arindam Banerjee, Vidyashankar Sivakumar

- We are studying the smoothed adversarial setting, specifically with neural models, where the contexts are chosen by an adaptive adversary but then nature smooths it with some gaussian noise with neural bandit models.

- We are also studying the empirical effects of using an online vs offline optimization oracle to train neural bandit models.

TEACHING EXPERIENCE

Introduction to Data Mining, Teaching Assistant	Aug 2023 – Dec 2023
University of Illinois, Urbana-Champaign	Urbana-Champaign, IL, USA
Reinforcement Learning, Teaching Assistant	Jan 2022 – Apr 2022
Indian Institute of Science, Bangalore	Bangalore, KA, India

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

HONORS AND AWARDS

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

- 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)

- Reviewer, 27th International Conference on Artificial Intelligence and Statistics (AISTATS), 2024

- Program Committee Member, 38th AAAI Conference on Artificial Intelligence, 2024

- Program Committee Member, 37th AAAI Conference on Artificial Intelligence, 2023

- Reviewer, European Control Conference (ECC), 2024

- Reviewer, IEEE Transactions on Automatic Control

- Reviewer, IEEE Control Systems Letters