

Souradip Chakraborty |

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Summary

Currently a 2nd-year Computer Science Ph.D. student at the University of Maryland, College Park working in the theoretical and practical aspects of Deep Reinforcement Learning and Representation Learning. Recently receipt of **Outstanding Paper Award, TSRML at Neurips2022** and **Outstanding Reviewer Award, Neurips 2022, AISTATS 2023**. Our latest research on **Possibilities of AI Text Detection** got significant attention in the community and media coverage.[Reference]

In the past, worked at Walmart Labs with a significant impact affecting hundreds of millions of users. Recognized as the **Google Developer Expert in Machine Learning'2019**, representing India. Batch Topper (*summa cum laude*) from Indian Statistical Institute. Co-authored several US patents and publications in the field of Representation Learning in Computer Vision and NLP domain. Selected as the Youngest Technical Speaker for the very prestigious Data Hack Summit'2018 & 2019 by Analytics Vidhya.

Research Interests

Interested in General utility Reward Design & AI Alignment, RLHF, Preference-based RL, Bayesian Reinforcement Learning, Bi-Level & Non-Convex Optimization

My overall goal is to develop large-scale robust algorithms for sequential decision-making tasks under practical and challenging limitations to make **Safe, Fair, Robust and Aligned to Human behavior & Societal Goals**

Education

University of Maryland, College Park

PhD, Computer science (Dean's Fellowship)

Fall 2021 – Present

Advisor: Prof.Furong Huang, Prof. Dinesh Manocha

Mentor: Dr. Alec Koppel - JPMorgan Chase

Research: Towards Sample-efficiency, Safety, Robustness & Alignment in reinforcement learning under Uncertainty, Constraints, Non-Stationarity and Sparse rewards scenarios

Indian Statistical Institute, Bangalore

Master's Degree (summa cum laude)

2016 – 2018

MS with Major in Data Science & Machine Learning **GPA: 9.4/10; Rank — 1 (Batch Topper)**

Advisor: Dr.B. S. Daya Sagar

Courses: Probability, Statistics, Inference, Statistical Machine Learning, Design of Experiments, Optimization and Reliability Theory.

Jadavpur University

Bachelor of Engineering, Electronics & Instrumentation Engineering

2010 – 2014

GPA: 8.4/10; Rank — 10

Preprints

- Souradip Chakraborty, Amrit Singh Bedi, Sicheng Zhu, Bang An, Dinesh Manocha, Furong Huang “**On the Possibilities of AI-Generated Text Detection**” Ref :arxiv
- Xiangyu Liu, Souradip Chakraborty, Yanchao Sun, Furong Huang “**Rethinking Adversarial Policies: A Generalized Attack Formulation and Provable Defense in Multi-Agent RL**” Ref :arxiv
- Souradip Chakraborty, Kasun Weerakoon, Prithvi Poddar, Pratap Tokekar, Amrit Singh Bedi, Dinesh Manocha “**REMOVE: An Adaptive Policy Design Approach for Dynamic Environments via Language-Based Feedback**”, Ref :arxiv

Publications

- Souradip Chakraborty, Amrit Singh Bedi, Alec Koppel, Mengdi Wang, Furong Huang, Dinesh Manocha “**STEERING: Stein Information Directed Exploration for Model-Based Reinforcement Learning**”, *40th International Conference on Machine Learning (ICML 2023)*

- Souradip Chakraborty, Amrit Singh Bedi, Alec Koppel, Dinesh Manocha, Furong Huang, Mengdi Wang **“Principal-Driven Reward Design and Agent Policy Alignment via Bilevel-RL”**, *Interactive Learning with Implicit Human Feedback Workshop (ICML 2023)*
- Souradip Chakraborty, Amrit Singh Bedi, Alec Koppel, Brian M. Sadler, Furong Huang, Pratap Tokekar, Dinesh Manocha **“Posterior Coreset Construction with Kernelized Stein Discrepancy for Model-Based Reinforcement Learning”**, *Thirty-Seventh AAAI Conference on Artificial Intelligence, (AAAI 2023, Oral)*[pdf]
- Souradip Chakraborty, Amrit Singh Bedi, Amrit Singh Bedi, Alec Koppel, Pratap Tokekar, Dinesh Manocha **“Dealing with Sparse Rewards in Continuous Control Robotics via Heavy-Tailed Policy Optimization”**, *2023 International Conference on Robotics and Automation, (ICRA 2023)*[pdf]
- Souradip Chakraborty*, Kasun Weerakoon*, Nare Karapetyan, Adarsh Jagan Sathyamoorthy, Amrit Singh Bedi, Dinesh Manocha **“HTRON:Efficient Outdoor Navigation with Sparse Rewards via Heavy Tailed Adaptive Reinforce Algorithm”**, *Conference on Robot Learning CoRL 2022*[pdf]
- Xiangyu Liu, Souradip Chakraborty, Furong Huang **“Controllable Attack and Improved Adversarial Training in Multi-Agent Reinforcement Learning”**, *Outstanding Paper Award at TSRML, Neurips’2022*[pdf]
- Amrit Singh Bedi, Souradip Chakraborty, Anjaly Parayil, Brian Sadler, Pratap Tokekar, Alec Koppel **“On the Hidden Biases of Policy Mirror Ascent in Continuous Action Spaces”**, *39th International Conference on Machine Learning (ICML 2022, Spotlight)*
- Souradip Chakraborty*, Ekansh Verma*, Ryan **“High-Dimensional Bayesian Optimization with Invariance”**, *ICML 2022 Workshop on Adaptive Experimental Design and Active Learning in the Real World* [pdf]
- Souradip Chakraborty, Ekaba Bisong, Shweta Bhatt, Thomas Wagner, Riley Elliott and Francesco Mosconi **“BioMed-BERT: A Pre-trained Biomedical Language Model for QA and IR”**, *28th International Conference on Computational Linguistics (COLING’2020)* [Website: pdf]
- Saswata Sahoo, Souradip Chakraborty **“Graph Spectral Feature Learning for Mixed Data of Categorical and Numerical Type”**, *25th International Conference on Pattern Recognition (ICPR’2020)* [pdf]
- Souradip Chakraborty, Sayak Paul, Aritra Roy Gosthipaty **“G-SimCLR: Self-Supervised Contrastive Learning with Guided Projection via Pseudo Labelling”**, *IEEE ICDM’2020, DLKT Workshop Proceedings* [pdf]
- Souradip Chakraborty, Ekansh Verma, Saswata Sahoo, Jyotishka Datta **“FairMixRep: Self-supervised Robust Representation Learning for Heterogeneous Data with Fairness constraints”**, *IEEE ICDM’2020, DLC Workshop Proceedings* [pdf]
- Ekansh Verma, Souradip Chakraborty, Vinodh Kumar **“Propaganda Fragment Detection using Diversified BERT Architectures based Ensemble Learning”**, *SemEval Workshop Proceedings, COLING’2020* [pdf]
- Ekansh Verma, Souradip Chakraborty, Vinodh Kumar **“Deep Multi-level Fusion Learning Framework for Multi-modal Product Classification”**, *SIGIR ecom’2020 Workshop Proceedings* [pdf]
- Ojaswini Chhabra, Souradip Chakraborty **“Siamese Triple Ranking Convolution Network in Signature Forgery Detection”**, *selected at AICAAM’19, selected and submitted to Pertanika journal* [pdf]
- Soumya Dasgupta, Kaushik Halder, Shohan Banerjee Souradip Chakraborty, Amitava Gupta **“Stability analysis and controller synthesis of networked control system (NCS) with arbitrary packet drop-outs”** *2nd International Conference on Electronics and Communication Systems (ICECS)’2015* (Link : paper)

Books & Live Projects

- Souradip Chakraborty, Sayak Paul **“Extractive Text Summarization of News Articles with NLP, Deep Learning, Python - An attention-based framework”**, *Manning Books Live Project* (Link: Website)

Patents

- Gregory Dixon, *Souradip Chakraborty*, Ojaswini Chhabra, Mallikharjuna Mv “**Reverse Engineering Food Ingredient Share estimation using Constrained Optimization**”, US Patent, Walmart Ref. 6031US01.
- *Souradip Chakraborty*, Abhishek Mishra, Somedip Karmakar “**Systems and methods for Unsupervised image processing**”, US Patent, Ref. US11688049B2
- Pranay Dugar *Souradip Chakraborty* “**Automated planogram anomaly detection with Computer Vision**”, US Patent, Ref. US11669843B2
- *Souradip Chakraborty*, Mani Garlapati “**Retail Based Cost Reverse Engineering and Cost comparison within Item Similarity Clusters for Cost Negotiations**”, US Patent, Walmart Ref. 5928US01.
- *Souradip Chakraborty*, Mani Garlapati “**Retail Based Cost Reverse Engineering and Cost comparison within Item Similarity Clusters for Cost Negotiations**”, US Patent, Walmart Ref. 5928US01.
- *Souradip Chakraborty*, Mani Garlapati “**Systems and Methods for Identifying Negotiable Items (Cost Analytics)**”, US Patent, Walmart Ref. 5604US01.
- *Souradip Chakraborty*, Rajesh Shreedhar Bhat, Mani Garlapati, “**System and Method For Automated Electronic Catalogue Management and Image Quality Assessment**”, US Patent, Walmart Ref.5118US01.
- *Souradip Chakraborty*, Rajesh Bhat, Mani Garlapati, Lakshmi Praneetha Kommuru, “**Generating Customized Alerts with Computer Vision and Machine Learning**”, US Patent, Walmart Ref. 5008US01.
- *Souradip Chakraborty*, Mani Garlapati “**Architecturally-Distributed Apparatus and Method to Form and Leverage Clustered Content (Customer intent based recommendation system)**”, US Patent, Walmart Ref. 4970US01.
- *Souradip Chakraborty*, Ojaswini Chhabra “**System and Method for Detecting Signature Forgeries**”, US Patent, Walmart Ref. 5603US01.
- *Souradip Chakraborty*, Rajesh Shreedhar Bhat, Somedip Karmakar “**Systems and methods for inventory management with Deep Vision**”, US Patent, Ref. US20230020026A1.
- Somedip Karmakar, *Souradip Chakraborty*, Abhishek Mishra “**Image processing based methods and apparatus for planogram compliance**”, US Patent, Ref. US20220415012A1.

Work Experience

Walmart Labs

Research Data Scientist || Statistical Machine Learning

Feb 2018 – Aug 2021

- **Explainable Deep Neural Information Retrieval and Efficient De-Biasing of Sentence Vectors for enhancing the Search Mechanism || Information Handling Services**
- **Ingredient Share estimation using Constrained Non-Convex Optimization with Lagrange's' multiplier for Walmart Food Department**
- **No-Reference Image Quality Assessment & Disentangled Learning using Deep Autoencoders and SSIM**
- **Customer Intent-based Recommender System and Hierarchical Product Classification**

Google Developer Expert, Google

Data Science Research

Feb 2018 – July 2018

Advisor Team: Google Research

- **AI vs COVID-19 BioMedical Research** Our goal is to make BioMedBERT a resource for biomedical researchers, doctors, and virologists, to augment their ability to sift through biomedical knowledge and existing research to extract novel insights and help them make new drug discoveries. (COLING'2020)

Australia and New Zealand Banking Group

Data Science Dept.

May 2017 – July 2017

Advisor: Dr. Krishnendu Chandra

- **State of cycle analysis**, Developed a Dynamic Index for dating Business cycles using Hodrick Prescott filter in the context of credit risk management for Mortgage portfolio in Australian economy. Cross-Validated the index for US-Economy.

Amec Foster Wheeler Pvt Ltd.

Research Engineer, Control and Statistics

July 2014-2016

- **Multivariate Statistical Quality Control in Oil and Gas field**

Blogs & Research Articles

- Souradip Chakraborty “**Detection of COVID-19 presence from Chest X-ray scans using CNN & Class Activation Maps**”, *Towards Data Science,Medium'2020*
- Souradip Chakraborty,Rajesh Shreedhar Bhat “**Reducing the Carbon Foot Prints of CNNs at the cost of interactions-Depthwise & Pointwise Convolution**”, *Towards Data Science,Medium'2020*
- Souradip Chakraborty “**Bayesian Thinking for Linear Regression @ Kaggle Days Meetup**”, *Towards Data Science,Medium'2020*
- Souradip Chakraborty,Amlan Jyoti Das & Sai Yashwanth “**Risks and Caution on applying PCA for Supervised Learning Problems**”, *Towards Data Science,Medium'2019*
- Souradip Chakraborty,Rajesh Shreedhar Bhat “**Why not Mean Squared Error(MSE) as a loss function for Logistic Regression?**”, *Towards Data Science,Medium'2019*.
- Souradip Chakraborty“**Dimensionality Reduction in Supervised Framework and Partial Least Square Regression**”, *Analytics Vidhya,Medium'2019*.

Selected Honors & Awards

- **Outstanding Paper Award** at **Neurips'2022**, TSRML Workshop for our research on Adversarial Robustness in Multiagent Reinforcement Learning
- **Outstanding Reviewer Award** Neurips'2022 || Awarded to 5% of the reviewers'
- **Outstanding Reviewer Award** AISTATS'2023 || Awarded to 2% of the reviewers'
- **Dean's Fellowship** Awarded to only 5 students in the first and second year in the Computer Science department at the University of Maryland.
- **Conference Awards** Received Travel and Participant awards for *ICML'23, AISTATS'23, Neurips'22*.
- 2019: Selected as the Technical speaker for the very prestigious **Data Hack Summit'2019 on Captioning & Attention Models by Analytics Vidhya**.
- 2019: Key-Note Lecturer to the Faculty of Presidency University, Bangalore in Statistical Learning Theory **Faculty Development Program**.
- 2019: Key-Note Lecturer to the students of Computer Science department of Coimbatore Institute of Technology **Machine Learning Workshop with Python**.
- 2019: Invited as a Technical Keynote speaker for **Target Talks AI Session-3** Bangalore'19.
- 2018: Selected as the Youngest Technical Keynote speaker for the very prestigious **Data Hack Summit'2018 by Analytics Vidhya**.
- 2018: **Batch Topper Certification** and **Endowment** for the highest academic performance (Rank-1) in Master's,Indian Statistical Institute.
- 2017: Selected at **Novartis Biocamp 2017** and represented ISI Bangalore in Novartis as a Data Scientist (top 50 nationwide).
- 2010-2014: **4-year scholarship** for academic excellence, Ministry of Human Resource & Development, India

Competitions

- **Runners up,Codeception 2019** Walmart Labs International Hackathon.
- **Rank-13,Crowd Analytix's Propensity to Fund Mortgages competition 2019** – Implemented LightGBM with error analysis to identify the curvature of the variables and interaction among the features in modelling the response variable.
- **Bronze Medal,Capillary Machine Learning Hackathon by Analytics Vidhya'2019** – Implemented Alternating Least Squares Method for Implicit recommendation.
- **Bronze Medal,WNS Analytics Wizard 2018 challenge** – An ensemble of Boosting and Deep Neural nets with synthetic minority oversampling was implemented to solve the classification problem with class imbalance.

Skillsets

- **Programming Languages:** Python, R, C/C++, MATLAB; **Web Development:** HTML
- **Deep Learning components:** *RNNs, *CNNs, *GANs, Attention, Capsule (* denotes variants)
- **Frameworks/Databases:** PyTorch, Keras, Tensorflow, PySpark, Teradata, MongoDB, Hive, SQL
- **Tools/Softwares:** NLTK, OpenCV, Octave, Docker, $\LaTeX 2_{\epsilon}$