# Ashudeep Singh

Applied Research Scientist, Pinterest, Inc.

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## Research Interests

Machine Learning · RecSys & Information Retrieval · Fairness in ML · Responsible AI · AI Safety

## Industry Experience

August 2021-present — **Applied Research Scientist, Advanced Technologies Group**, *Pinterest, Inc.*, Palo Alto, CA.

- **ML for Interactive systems**: Applying and exploring state-of-the-art machine learning algorithms that learn from sequential human feedback data to enhance Pinterest's search and recommendation systems, spanning Graph ML, Reinforcement Learning, and sequential models such as Transformers.
- **Responsible, Safe and Inclusive AI**: Drive responsible ML and inclusive AI frameworks to promote algorithmic fairness, diversity, and inclusive system design in Pinterest's production systems. Improve the safety, trust, and reliability of production-scale AI systems across user groups, content segments, and product surfaces. This work has led to multiple successful product launches with user engagement wins, research papers at ACM FAccT 2023 and WISE 2023, and a tutorial at NeurIPS 2022.

January–May 2020 — **Research Intern**, *Google Brain*, New York, NY.

**Safe Reinforcement Learning for Sequential Recommender Systems**

*Research Internship project mentored by **Alex Beutel** (Google Brain).*

Formulated and developed a sequential recommendation framework that considers the long-term well-being of users, and proposed a novel policy gradient algorithm based on Safe Reinforcement Learning (Safe RL) that provides risk guarantees for the worst-case users. Presented the work at FAccTRec Workshop at ACM RecSys 2020.

May–August 2019 — **Research Intern**, *Microsoft Research*, Montreal, QC, Canada.

**Feedback Loops and Producer-side Fairness in Recommender Systems**

*Research Internship project working with **Fernando Diaz** (FATE Group).*

Theoretically and empirically studied the intertwined phenomenon of *selection bias* and *exposure unfairness* for producers in a recommender system feedback loop.

May–August 2017 — **Research Intern**, *Facebook*, Menlo Park, CA.

**Active Learning for Multilabel Classification on Newsfeed**

*Research internship project working with **Khalid El-Arini** (Facebook Newsfeed).*

Developed an active learning approach to optimize the trade-off between human labeling cost and model accuracy for a large-scale multilabel classification problem for Facebook Newsfeed, improving labeling efficiency by up to 30%.

May–August 2016 — **Research Intern**, *Microsoft Research Lab*, New York City, NY.

**Contextual Bandits for Personalization of Notifications in Microsoft Health App**

*Research internship project working with **John Langford** (MSR NYC) and **Ryen White** (MSR Redmond).*

Developed a *Contextual Bandits*-based approach to personalize reminders and notifications on the Microsoft Health App in order to optimize users' long-term health and fitness.

## Education

2015-2021 — **Ph.D. Computer Science**, *Cornell University*, Ithaca, NY.

Title: Fairness of Exposure for Ranking Systems.
Advisor: Thorsten Joachims
Thesis Committee: Solon Barocas, Karthik Sridharan, David Mimno.
GPA– 4.0

2010–2015 — **B.Tech.-M.Tech. Dual Degree**, *Indian Institute of Technology (IIT) Kanpur*, India.

Major: Computer Science and Engineering.
M.Tech. GPA– 10.0/10.0, BTech. GPA– 9.6/10.0 (Academic Excellence Award – all years)

## Selected Publications

Ashudeep Singh, Yoni Halpern, Nithum Thain, Konstantina Christakopoulou, Ed H. Chi, Jilin Chen, Alex Beutel. **"Building Healthy Recommendation Sequences for Everyone: A Safe Reinforcement Learning Approach"**. In FAccTRec Workshop at ACM RecSyS, 2020.

Ashudeep Singh, David Kempe, Thorsten Joachims. **"Fairness in Ranking under Uncertainty"**. In Proceedings of Advances in Neural Information Processing Systems (NeurIPS) 2021.

Marco Morik*, Ashudeep Singh*, Jessica Hong, Thorsten Joachims. **"Controlling Fairness and Bias in Dynamic Learning-to-Rank"**. In Proceedings of 43rd International ACM SIGIR Conference on Research and Development in Information Retrieval 2020. (*equal contribution) **[Best Paper Award]**

Ashudeep Singh, Thorsten Joachims. **"Policy Learning for Fairness in Ranking"**. In Proceedings of Advances in Neural Information Processing Systems (NeurIPS) 2019, Vancouver, BC, Canada.

Ashudeep Singh, Thorsten Joachims. **"Fairness of Exposure in Rankings"**. In KDD '18: The 24th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining (KDD), 2018, London, UK.

Tobias Schnabel, Adith Swaminathan, Ashudeep Singh, Navin Chandak, Thorsten Joachims. **"Recommendations as Treatments: Debiasing Learning and Evaluation"** In Proceedings of The International Conference on Machine Learning (ICML), 2016, New York, NY.

Complete list on the homepage and Google Scholar .

## Awards and Achievements

2020 Awarded the **Best Paper Award** at ACM SIGIR 2020.

2019 Outstanding Teaching Assistant Award by the Department of Computer Science for CS6780: Advanced Machine Learning class.

2019 Awarded the NeurIPS Travel Award to attend NeurIPS 2019, Vancouver, BC, Canada.

2018 Awarded the ACM Student Travel Award to attend SIGKDD 2018, London, UK.

2015 **Ranked first** in the M.Tech. class of 108 students graduating in 2015 at IIT Kanpur.

2011–2015 Awarded **Academic Excellence Award** for outstanding academic achievements at IIT Kanpur for each academic year.

2010–2014 Awarded **CBSE Merit Scholarship for Professional Studies** by Central Board of Secondary Education, India.

2012 Recipient of **Summer Undergraduate Research Grant for Excellence (SURGE)**, granted by Dean Resource Planning and Generation, IIT Kanpur.

## Professional Service

- **Area Chair/Meta-Reviewer** for NeurIPS 2023, ICML 2022.
- **Reviewer** for ICML 2019-2023, NeurIPS 2019-2022, AAAI 2020, ICLR 2021-2022.
- **Senior Program Committee** member for ACM EAAMO 2022.
- **Ethics Reviewer** for NeurIPS 2022-2023 and **Datasets and Benchmarks Reviewer** for NeurIPS 2022.
- **Program Committee** member for TheWebConf 2022-2023, ACM FAccT 2021-2024, ACM RecSys 2021.

## Tutorials and Teaching

- **Tutorial** at Neural Information Processing Systems (NeurIPS) 2022 on Fair and Socially Responsible ML for Recommendations, co-taught with Manish Raghavan (MIT) and Hannah Korevaar (Meta).
- **Teaching Assistant** for CS6780: Advanced Machine Learning (2019), CS4786: Machine Learning for Data Science (2016), CS4780/5780: Machine Learning for Intelligent Systems (2015) at Cornell University, CS679: Machine Learning for Vision (2015), and ESC101: Fundamentals of Computing (2014) at IIT Kanpur.