

# Ashudeep Singh

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## Research Interests

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

## Work Experience

Aug 2024 – **Principal Applied Scientist, Microsoft AI**, Mountain View, CA.

- Present
- **Tech Lead, Agentic Multimodal Search** – Leading the development of multimodal retrieval and reasoning systems for Bing and Copilot. Designing architectures and agentic workflows that enable low-latency retrieval and grounding across images, text, and structured data at web scale.
  - Built scalable pipelines to distill foundation models into efficient, real-time variants for inference and personalization, exploring trade-offs among efficiency, capability, and safety.
  - Researching practical challenges in model alignment and safety, with a focus on preserving capabilities and alignment properties during model distillation, supervised fine-tuning, and RLHF.

Aug 2021 – **Applied Scientist, Advanced Technologies Group, Pinterest, Inc.**, Palo Alto, CA.

- Aug 2024
- **ML for Interactive Systems:** Applying and exploring state-of-the-art machine learning algorithms for ranking & retrieval models that learn from sequential human feedback data, spanning Graph ML, Reinforcement Learning, and sequential models such as Transformers, scaled to serve 100M+ requests per day.
  - **LLM Safety & Bias Evaluation:** Pioneered company's efforts towards rigorously evaluating LLMs and image generation models for bias, safety, and fairness through red-teaming and continuous measurement and monitoring systems.
  - **Responsible AI Framework Development:** Defining Pinterest's Responsible AI framework to ensure algorithmic fairness, diversity, and inclusive system design in Pinterest's recommender systems.

This work resulted in multiple successful product launches (in Pinterest Search, Related Pins, Related Products) with measurable user engagement improvements, research publications at ACM FAccT 2023 and ACM EC 2024, and a tutorial at NeurIPS 2022.

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

- 2020
- **Safe Reinforcement Learning for Sequential Recommender Systems** with **Alex Beutel**. Developed a sequential recommendation framework considering long-term user well-being and designed a novel policy gradient algorithm to optimize user engagement in the presence of safety constraints.

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

- 2019
- **Feedback Loops and Producer-side Fairness in Recommender Systems** with **Fernando Diaz** (FATE Group). Studied selection bias and exposure fairness in recommender system feedback loops.

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

- 2017
- **Active Learning for Multilabel Classification on Newsfeed** with **Khalid El-Arini**. Optimized trade-off between human labeling cost and model performance, improving labeling efficiency by up to 30% for the same accuracy.

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

- 2016
- **Contextual Bandits for Personalization of Notifications** with **John Langford** and **Ryen White**. Personalized health app notifications using contextual bandits.

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## Education

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

Advisor: Thorsten Joachims

Thesis Committee: Solon Barocas, Karthik Sridharan, David Mimno.

Title: Fairness of Exposure for Ranking Systems.

Relevant Coursework: Machine Learning Theory, Advanced Topics in Machine Learning, Design and Analysis of Algorithms, Causality and Learning for Intelligent Decision Making, Ethics, and Policy in Data Science. Grade Point Average (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 for all years)

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## Publications

### Conference Publications

Madhav Kumar, Pedro Silva, Ashudeep Singh, and Abhay Varmaraja. **“Inclusive Recommendations and User Engagement: Experimental Evidence from Pinterest”**. At ACM Conference on Economics and Computation (EC), 2024.

Pedro Silva, Bhawna Juneja, Shloka Desai, Ashudeep Singh, Nadia Fawaz. **“Representation Online Matters: Practical End-to-End Diversification in Search and Recommender Systems”**. In Proceedings of the 2023 ACM Conference on Fairness, Accountability, and Transparency (FAccT), 2023. [↗](#)

Sahil Verma, Ashudeep Singh, Varich Boonsanong, John P. Dickerson, Chirag Shah. **“RecRec: Algorithmic Recourse for Recommender Systems”**. In Proceedings of the 32nd ACM International Conference on Information and Knowledge Management (CIKM), 2023. [↗](#)

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 and Thorsten Joachims. **“Policy Learning for Fairness in Ranking”**. In Proceedings of Advances in Neural Information Processing Systems (NeurIPS) 2019, Vancouver, BC, Canada. [↗](#)

Ashudeep Singh and Thorsten Joachims. **“Fairness of Exposure in Rankings”**. In ACM SIGKDD International Conference on Knowledge Discovery & Data Mining (KDD) 2018, London, United Kingdom. [↗](#)

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, USA. [↗](#)

David Adamson, Akash Bharadwaj, Ashudeep Singh, Colin Ashe, David Yaron, Carolyn P. Rosé. **“Predicting Student Learning from Conversational Cues”**. In Proceedings of 12th International Conference of Intelligent Tutoring Systems (ITS) 2014, Honolulu, HI, USA. [↗](#)

David Adamson, Divyanshu Bhartiya, Biman Gujral, Radhika Kedia, Ashudeep Singh, Carolyn P. Rosé. **“Automatically Generating Discussion Questions”**. In Proceedings of 16th International Conference of Artificial Intelligence in Education (AIED) 2013, Memphis, TN, USA. [↗](#)

## Journal Publications

Yi Fang\*, Ashudeep Singh\*, Zhiqiang Tao\*. “**Fairness in Search Systems**”. Foundations and Trends® in Information Retrieval, Vol. 18 (2024). (\* alphabetical order) [↗](#)

## Workshop Papers

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**”. At FAccTRec Workshop at ACM RecSys, 2020. [↗](#)

Ashudeep Singh, Thorsten Joachims. “**Equality of Opportunity in Rankings**”. At Workshop on Prioritising Online Content at NeurIPS 2017. [↗](#)

Ashudeep Singh, Thorsten Joachims. “**Learning item embeddings using biased feedback**”. At Causal Inference and Machine Learning for Intelligent Decision Making Workshop at NeurIPS 2017. [↗](#)

Complete list on the homepage [↗](#) and Google Scholar [↗](#).

## Awards and Recognition

- 2024 **Outstanding Reviewer Award**, The Web Conference.
- 2020 **Best Paper Award**, ACM SIGIR.
- 2019 **Outstanding Teaching Assistant Award**, Cornell Computer Science Department
- 2015 **Ranked First** in M.Tech. class (108 students), IIT Kanpur.
- 2011–2015 **Academic Excellence Award** (all years), IIT Kanpur.
- 2010–2014 **CBSE Merit Scholarship for Professional Studies** by Central Board of Secondary Education, India.
- 2012 **Summer Undergraduate Research Grant for Excellence (SURGE)**, granted by Dean Resource Planning and Generation, IIT Kanpur.

## Professional Service

- **Area Chair/Meta-Reviewer** for ICML 2022, NeurIPS 2023, 2024, 2025.
- **Program Committee** (PC member)
  - ACM FAccT Conference 2021-2024
  - FAccTRec workshop at ACM RecSys 2020
  - FACTS-IR Workshop at SIGIR 2019
  - Repl4NLP Workshop at ACL 2018
- **Reviewer**
  - NeurIPS 2019, 2020, 2021, 2022
  - ICML 2019, 2020, 2021, 2023, 2024, 2025
  - ICLR 2021, 2022, 2025
  - Recsys 2021
  - AAAI 2020
- **Ethics Reviewer** for NeurIPS 2022-2023 and **Datasets & Benchmarks Reviewer** for NeurIPS 2022.
- **Senior Program Committee** member for ACM EAAMO 2022.
- **Session Chair** at NeurIPS 2023 for a session on Fairness and Explainability in Machine Learning.
- **Invited Talks**
  - “Fairness of Exposure in Ranking” at:
    - Mechanism Design for Social Good (MD4SG) (March 2019)
    - Amazon (Feb 2021)
    - Google (March 2021)
    - Meta (March 2021)
    - Spotify (March 2021)
  - “Building Healthy Recommendation Sequences for Everyone: A Safe RL Approach” at:
    - FAccTRec Workshop @ ACM RecSys (September 2020)
    - Workshop on Responsible Recommender Systems (Virtual) at Meta (November 2022)
  - “Responsible ML for Real-World Search and Recommender Systems: A Multistakeholder Perspective”: Guest Lecture at USC Marshall School of Business for the Operations Management undergraduate class (BUAD 311, Instructor: Angela Zhou) (October 2023)

- “Thinking Fairness in Online Platforms: A two-sided perspective”: Guest Lecture at USC Marshall School of Business undergraduate class “AI: Perils, Pitfalls, and Promises” (BUAD 498, Instructor: Vishal Gupta). (March 2023)

## Technical Skills

- **Programming Languages:** Python, C++, Java, C#, SQL
- **Machine Learning Frameworks:** Pytorch, Tensorflow, JAX.
- **Other tools and frameworks:** Spark, Hadoop, Pandas, NumPy, Git, Docker, AWS (S3, EC2, Lambda).

## Teaching and Mentorship

- **Tutorial** at Neural Information Processing Systems (NeurIPS) 2022 Conference (December 2022)
  - Title: Fair and Socially Responsible ML for Recommendations ☑
  - Co-organized with Manish Raghavan (MIT) and Hannah Korevaar (Meta).
- **Teaching Assistant** for Advanced Machine Learning (CS6780, Cornell), Machine Learning for Data Science (CS4786, Cornell), Machine Learning for Intelligent Systems (CS4780/5780, Cornell), Machine Learning for Vision (CS679, IIT Kanpur), Fundamentals of Computing (Graduate Student Instructor, ESC101, IIT Kanpur).
  - Awarded *Outstanding TA Award* by the Department of Computer Science for CS 6780
- Mentored and collaborated with several undergraduate and master’s students at Cornell University and Pinterest. (2017-2021)

## Positions of Responsibility and Extra Curricular Activities

- Served on the Ph.D. Admissions Committee for the Department of Computer Science, Cornell University. (2019-20)
- Co-developed **ViCoRecS: Virtual Conference Recommender System** to provide attendees at KDD 2020 with relevant Networking and Paper recommendations, which was used by ~1000 users. ☑ (2020)
  - Published the result of a research experiment conducted as part of this deployment at NeurIPS 2021.
- Organized the **Machine Learning Discussion Group** at Cornell University. ☑ (2016-18)
- Student Guide, Academic Mentor, and Link Student for Counselling Service, IIT Kanpur. (2011–13)