

# Avijit Ghosh

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Algorithmic Fairness

Ethical AI

Machine Learning

AI Explainability

Computational Social Science

## Education

### Northeastern University

Ph.D. in Computer Science (Advised by Dr. Christo Wilson)

Boston, MA

2019 - 2023

### Indian Institute of Technology (IIT) Kharagpur

B.Tech. in Chemical Engineering, M.Tech in Financial Engineering, Minor in Computer Science

Kharagpur, India

2014 - 2019

## Doctoral Thesis

### Algorithmic Fairness in the Real World: Challenges and Considerations

Defended June 2023

- Social bias in machine learning algorithms is a widespread problem that has been addressed through various measures, but implementing fair machine learning systems in the real world is challenging due to issues like noisy demographic information, adversarial vulnerabilities, policy restrictions and complex interactions between humans and algorithms.
- In my thesis, I attempt to outline these problems in fair ML systems, with the aim to gain a more complete understanding of the challenges involved and to be able to provide technical and policy recommendations to overcome their real world implementation challenges.

## Publications

### Peer-Reviewed Conference

#### When Fair Classification Meets Noisy Protected Attributes

Avijit Ghosh, Pablo Kvitca, Christo Wilson

AIES '23

Montreal, Canada

#### Queer In AI: A Case Study in Community-Led Participatory AI

Organizers of Queer In AI (50 authors)

FACCT '23

Chicago, Illinois

#### Subverting Fair Image Search with Generative Adversarial Perturbations

Avijit Ghosh, Matthew Jagielski, Christo Wilson

FACCT '22

Seoul, South Korea

#### FairCanary: Rapid Continuous Explainable Fairness

Avijit Ghosh\*, Aalok Shanbhag\*, Christo Wilson

AIES '22

Oxford, United Kingdom

#### Algorithms that "Don't See Color": Comparing Biases in Lookalike and Special Ad Audiences

Piotr Sapiezynski, Avijit Ghosh, Levi Kaplan, Alan Mislove, Aaron Rieke

AIES '22

Oxford, United Kingdom

#### When Fair Ranking Meets Uncertain Inference

Avijit Ghosh, Ritam Dutt, Christo Wilson

SIGIR '21

Montreal, Canada / Virtual

#### Building and Auditing Fair Algorithms: A Case Study in Candidate Screening

Christo Wilson, Avijit Ghosh, Shan Jiang, Alan Mislove, Lewis Baker, Janelle Szary, Kelly Trindel, Frida Polli

FACCT '21

Toronto, Canada / Virtual

#### Public Sphere 2.0: Targeted Commenting in Online News Media

Ankan Mullick, Sayan Ghosh\*, Ritam Dutt\*, Avijit Ghosh\*, Abhijnan Chakrabarty

ECIR '19

Cologne, Germany

## Peer-Reviewed Workshop

### Can There be Art Without an Artist?

Avijit Ghosh, Genoveva Fossas

HEGM@NeurIPS '22

New Orleans, USA

### Characterizing Intersectional Group Fairness with Worst-Case Comparisons

AIDBEI@AAAI '21

Avijit Ghosh, Lea Genuit, Mary Reagan

Vancouver, Canada / Virtual

### Analyzing Political Advertisers' Use of Facebook's Targeting Features

Conpro@S&P '19

Avijit Ghosh, Giridhari Venkatadri, Alan Mislove

San Francisco, USA

### SAVITR: A System for Real-time Location Extraction from Microblogs during Emergencies

SMERP@WWW '18

Ritam Dutt, Kaustubh Hiware, Avijit Ghosh, Rameshwar Bhaskaran

Lyon, France

### WebSelect: A Research Prototype for Optimizing Ad Exposures based on Network Structure

WITS'19

Avijit Ghosh, Agam Gupta, Divya Sharma, Uttam Sarkar

Dublin, Ireland

## Peer-Reviewed Journal

### Connectedness of Markets with Heterogeneous Agents and the Information Cascades

AAA'21

Avijit Ghosh, Aditya Chourasiya, Lakshay Bansal, Abhijeet Chandra

Journal

## Preprints and Working Manuscripts

### Unified Shapley Framework to Explain Prediction Drift

Preprint

Aalok Shanbhag\*, Avijit Ghosh\*, Josh Rubin\*

### Supervised extraction of catchphrases from legal documents

Term paper

Avijit Ghosh\*, Prerit Gupta\*, Ritam Dutt, Kaustubh Hiware, Arpan Mandal, Kripabandhu Ghosh, Sap-tarshi Ghosh

\*Equal contribution

## Awards and Grants

2022	<b>Winner</b> Best Paper - Runner Up	Conpro'22
2019	<b>Winner</b> Best Poster Award	ECIR'19
2019	<b>Dean's Fellowship</b> for first Year PhD students (USD 72K)	Northeastern University
2019	<b>Winner</b> Institute Order of Merit - Technology	IIT Kharagpur
2018	<b>Winner</b> SGSIS Institute Challenge Grant (INR 1M)	IIT Kharagpur
2017	<b>Silver Medal</b> Stock Market Analysis	Inter IIT Tech Meet, Kanpur
2016	<b>Gold Medal</b> Software Development	Inter IIT Tech Meet, Mandi
2012	<b>Governor's Medal</b> National Rank 5, ICSE Board	Government of West Bengal
2010	<b>NTSE Scholar</b> National Talent Search Examination	NCERT

## Teaching

### Responsible Machine Learning

Northeastern University

Adjunct Professor

Fall 2023

- Explores the ethical challenges and responsibilities of creating and deploying machine learning (ML) models.
- Biases in ML models, methods for uncovering them, and algorithmic fairness techniques to mitigate them
- Term project to apply algorithmic fairness to a real world scenario

### Algorithmic Auditing

Northeastern University

Teaching Assistant for Dr. Piotr Sapiezynski

Spring 2022

- Designing audits that measure the effects of interests and control noise sources
- Minimize potential harms of audits to all stakeholders
- Legal bounds of algorithm audits
- Beyond audits: potential harms that cannot be measured through audits

## Academic Experience

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### Northeastern University

Boston, MA

Research Assistant at Khoury College of Computer Sciences

Sep. 2019 – Present

- Analyzing Fair ranking systems and showing how they fail in the presence of noisy protected attribute data. Also investigated adversarial attacks on the guaranteed fairness of retrieval systems.
- A cooperative fairness audit of the recommendation algorithm of [PyMetrics](#), a talent matching software. [Press Release](#).
- Investigated Facebook's Special Audiences system for opportunity advertisements and showed that the audience creation algorithm was still biased against women, seniors and minorities.
- Analyzed the ad reach and spend information obtained from Facebook's ad transparency feature and the personal targeting dataset from Propublica's Facebook ad dataset and showed that advertisers with higher budgets use more privacy sensitive targeting techniques like PII or Lookalike audiences. Findings published and presented at [IEEE ConPro 2019](#).

### LIG, University of Grenoble Alps

Grenoble, France

Visiting Researcher

May 2019 – July 2019

- Study of how news companies promote different items on social media, investigating possible patterns of differential information spreading using both posts and ads.
- We also discovered and reported an exposed access token bug to [Facebook Bug Bounty](#).

### IIT Kharagpur

Kharagpur, India

Undergraduate Researcher - Complex Networks Research Group

2014 – 2019

- Automated Extraction of Catchwords from Legal Documents using a novel NER tagger to help categorize lengthy legal texts.
- Automatically position user comments against relevant news article paragraphs. Presented at [ECIR 2019](#).
- Savitr - A real-time location extraction system for disaster management using twitter. Presented at [WWW-SMERP 2018](#).
- Classification and Summarization of tweets during a disaster event, presented at [IBM Day 2016](#).

## Industry Experience

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### Twitter

San Francisco, CA

Research Intern

Sep – Dec 2021 and Jun – Aug 2022

- Worked with the META (Machine Ethics, Transparency and Accountability) team at Twitter, to investigate the relationship between demography agnostic and demography dependent author impression fairness metrics at scale.
- Developed home timeline diversity metrics based on user feedback, to find balance between recommendation efficiency and fairness.

### Fiddler Labs

Palo Alto, CA

Research Intern

Oct 2020 – Apr 2021

- Explain distributional shifts in Machine Learning model outputs by unifying Shapley based methods.
- Using optimal transport theory, proposed a threshold independent fairness metric that allows for real time explanations.
- Worked with the product team and civil rights lawyers in the deployment of Fiddler's Machine Learning model fairness dashboard. Introduced and incorporated intersectional fairness metrics in the product.

### Xerox Research Centre

Bangalore, India

Research Intern

May 2017 – July 2017

- Implemented XTrack, a Smart Vehicle Tracking and Battery usage minimizing Algorithm, using BLE to relay GPS information.
- Proposed a method for Uber-like Surge Price Prediction using Spatio-Temporal techniques like the Neural Hawkes and Recurrent Marked Temporal Point Process. Awarded the title of [Best Internship Project](#).

### Google Summer of Code

Remote

GSoc Student at OpenMRS

Apr 2016 – Aug 2016

- Replaced the HTML XForms system used with native generated forms using the Forms REST Api in the android client of the Opensource Medical Record System. Added offline form saving. Configured Travis CI to automatically build and push the apk to the play store.
- Overall, contributed 100K lines of code and became the top code contributor in the project repository.

## Academic Service

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2023	<b>AAAI/ACM Conference on AI, Ethics, and Society</b>	Reviewer
2023	<b>ACM Conference on Fairness, Accountability, and Transparency</b>	Reviewer
2023	<b>The Web Conference</b>	Reviewer
2022	<b>ACM Conference on Fairness, Accountability, and Transparency</b>	Reviewer
2022	<b>AAAI/ACM Conference on AI, Ethics, and Society</b>	Reviewer
2022	<b>Conference on Neural Information Processing Systems</b>	Reviewer
2022	<b>Conference on Empirical Methods in Natural Language Processing</b>	Reviewer
2021	<b>Conference on Neural Information Processing Systems</b>	Reviewer

## Outreach and Leadership

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2022	<b>FAccT CRAFT Workshop on Identifying Queer Harms as a bias bounty with Queer in AI</b>	Organizer
2021	<b>SIGIR Queer in AI social with speaker panel on queer stereotypes in web search</b>	Organizer
2017	<b>Kharagpur Winter Of Code</b>	Founder
2016	<b>Kharagpur Open Source Society</b>	Founder

## Speaking Engagements

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2023	<b>Can There be AI Art Without an Artist?</b>	South By Southwest (SXSW)
2023	<b>On the evolving tension between centralized regulation and decentralized development of Text-to-Image Models</b>	AIDBEI at AAAI
2022	<b>Proxies for bias monitoring: Ethics workshop</b>	Centre for Data Ethics and Innovation, UK
2022	<b>Subverting Fair Image Search with Generative Adversarial Perturbations</b> as part of the 'Celebrating Young Researchers' event	Trustworthy ML Initiative

## Press Mentions

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2023	<b>From accessibility efforts to ethical concerns, here are our AI takeaways from SXSW content creators should consider</b>	Passionfruit
2021	<b>NYC aims to be first to rein in AI hiring tools</b>	Associated Press
2021	<b>Auditors are testing hiring algorithms for bias, but there's no easy fix</b>	MIT Technology Review
2021	<b>New York City Proposes Regulating Algorithms Used in Hiring</b>	Wired
2021	<b>Supporting Responsible Use of AI and Equitable Outcomes in Financial Services</b>	The Federal Reserve
2019	<b>Facebook Ads Can Still Discriminate Against Women and Older Workers, Despite a Civil Rights Settlement</b>	Propublica
2019	<b>Facebook Agreed Not to Let Its Ads Discriminate. But They Still Can.</b>	Mother Jones