Avijit Ghosh

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Algorithmic Fairness | Ethical AI | Machine Learning | AI Explainability | Computational Social Science

Education

Northeastern University — Boston, MA
Ph.D. candidate in Computer Science — *2019 - Present*

Indian Institute of Technology (IIT) Kharagpur — Kharagpur, India
B.Tech. in Chemical Engineering, M.Tech in Financial Engineering, Minor in Computer Science — *2014 - 2019*

Experience

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.

Northeastern University — Boston, MA
Research Assistant at Khoury College of Computer Sciences | Advisors: Alan Mislove, Christo Wilson — *Sep. 2019 – Present*

- Analyzing Fair ranking systems and showing how they fail in the presence of noisy protected attribute data. Currently looking at adversarial attacks on Fair retrieval systems.
- A cooperative fairness audit of the recommendation algorithm of PyMetrics, a talent matching software. Press Release, Wired article.
- Investigated Facebook's Special Audiences system for opportunity advertisements and showed that the audience creation algorithm was still biased against women, seniors and minorities. Covered in the media by Propublica, The Federal Reserve and Mother Jones.
- 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 | Advisor: Oana Goga — *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.
- Extensive mining and analysis code developed in this project currently still being used in a long running facebook ad study between NYU, University of Grenoble, and other participating institutions.
- We also discovered and reported an exposed access token bug to Facebook Bug Bounty.

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 play store.
- Overall, contributed 100K lines of code and became the top code contributor in the project repository.

IIT Kharagpur — Kharagpur, India
Undergraduate Researcher | Advisors: Niloy Ganguly, Saptarshi Ghosh - CNERG Lab — *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.

Select Publications

Archival

When Fair Ranking Meets Uncertain Inference — SIGIR '21
Avijit Ghosh, *Ritam Dutt, Christo Wilson* — *Montreal, Canada / Virtual*

Building and Auditing Fair Algorithms: A Case Study in Candidate Screening — FAccT '21
Christo Wilson, **Avijit Ghosh**, *Shan Jiang, Alan Mislove, Lewis Baker, Janelle Szary, Kelly Trindel, Frida Polli* — *Toronto, Canada / Virtual*

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*

Public Sphere 2.0: Targeted Commenting in Online News Media — ECIR '19
Ankan Mullick, Sayan Ghosh, Ritam Dutt*,* **Avijit Ghosh***, *Abhijnan Chakrabarty* — *Cologne, Germany*

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*

Preprints

Compromising Fair Ranking with Universal Adversarial Perturbations — Under Review
Avijit Ghosh, *Matthew Jagielski, Christo Wilson*

FairCanary: Rapid Continuous Explainable Fairness — Under Review
Avijit Ghosh*, *Aalok Shanbhag**

Algorithms that "Don't See Color": Comparing Biases in Lookalike and Special Ad Audiences — Under Review
Piotr Sapiezynski, **Avijit Ghosh**, *Levi Kaplan, Alan Mislove, Aaron Rieke*

Unified Shapley Framework to Explain Prediction Drift — Under Review
Aalok Shanbhag,* **Avijit Ghosh***, *Josh Rubin**

Miscellaneous

Connectedness of Markets with Heterogeneous Agents and the Information Cascades — App. Adv. Analytics'21
Avijit Ghosh, *Aditya Chourasiya, Lakshay Bansal, Abhijeet Chandra* — *Journal*

WebSelect: A Research Prototype for Optimizing Ad Exposures based on Network Structure — WITS'19
Avijit Ghosh, *Agam Gupta, Divya Sharma, Uttam Sarkar* — *Dublin, Ireland*

Supervised extraction of catchphrases from legal documents — Term paper
Avijit Ghosh*, *Prerit Gupta*, Ritam Dutt, Kaustubh Hiware, Arpan Mandal, Kripabandhu Ghosh, Saptarshi Ghosh*

** Equal contribution*

Awards and Grants

2019 **Dean's Fellowship**, First Year PhD students — *Northeastern University*
2019 **Winner**, Best Poster Award — *ECIR'19*
2019 **Winner**, Institute Order of Merit - Technology — *IIT Kharagpur*
2018 **Winner**, SGSIS Institute Challenge Grant - Worth INR 1 Million — *IIT Kharagpur*
2017 **Silver Medal**, Stock Market Analysis — *Inter IIT Tech Meet, Kanpur*
2016 **Gold Medal**, Software Development — *Inter IIT Tech Meet, Mandi*
2010 **NTSE Scholar**, National Talent Search Examination — *NCERT*

Academic Service

2021 **Reviewer** — *NeurIPS, EMNLP*

Technical Skills

Languages: Python, Java, C, R, Bash, SQL, HTML/CSS, JavaScript, Matlab

Tools & Frameworks: Git, TravisCI, Pytorch, Keras, TensorFlow, Docker, AWS, Sagemaker, Google Cloud ML, Android

Machine Learning: Transformers/BERT, ResNets, Adversarial examples, Fairness, Explainability