Falaah Arif Khan

COMPUTER SCIENTIST · ARTIST

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Education

New York University   *New York City, NY*

PHD IN DATA SCIENCE   *2021 - present*

- CGPA: 3.834/4
- Advisor: Prof. Julia Stoyanovich
- My research broadly focuses on the 'fairness' and 'robustness' of algorithmic systems.

Shiv Nadar University   *Greater Noida, India*

B.TECH IN ELECTRONICS AND COMMUNICATION ENGINEERING (WITH DISTINCTION)   *2014-2018*

- CGPA: 8.87/10
- Minor in Mathematics
- Thesis: Behavioral Biometrics and Machine Learning to secure Web Logins
- Supervisors: Sajin Kunhambu (Dell) and Madhur Deo Upadhayay (Shiv Nadar University)

Professional Experience

Center for Responsible AI, New York University   *Remote/New York City, NY*

ARTIST IN RESIDENCE   *Oct 2020 - Present*

- I explore the use of comic books as a novel medium of scientific scholarship, and as a vehicle for public education.
- I run the 'Data Responsibly' comic series with Prof Julia Stoyanovich, targeted at data science enthusiasts, students and practitioners. Volume 1 titled 'Mirror, Mirror' is a primer on responsible data science and deals with digital accessibility and the impact of poorly designed systems on marginalized demographic groups, and ties together these topics with broader issues in the ML landscape, including problems with operationalizing fairness in AI systems, misguided incentive structures in scholarship, exclusionary discourse, and questions of culpability when things go wrong. Volume 2 titled 'Fairness and Friends' is our attempt to bridge 'fairness' ideas from different disciplines, notably, computer science and political philosophy using doctrines of 'equality of opportunity'. A third volume is currently in the works!
- As part of the center's effort to develop educational materials and methodologies to teach members of the public about responsible AI, I co-created the 'We Are AI' comic series, with Prof Julia Stoyanovich. It is a 5-part series and accompanies our free public education course (of the same name), with one volume for each module.

Montreal AI Ethics Institute   *Remote*

ARTIST IN RESIDENCE   *July 2020 - Feb 2021*

- I conducted creative explorations into the socio-political underpinnings of data-driven technology, with emphasis on the role of Power and how it influences the design of AI. My visual essay 'Decoded Reality' is an artistic depiction of how algorithmic interventions manifest in society, and was an exhibit at the Resistance AI Workshop at NeurIPS 2020

International Institute of Information Technology, Hyderabad   *Remote*

RESEARCH FELLOW   *Aug - Dec 2020*

- Jointly advised by Prof CV Jawahar and Prof Vinay Namboodiri, I worked on the neural machine translation of Indic languages, focusing on the robustness of translations between different information domains and different source and target languages

Dell EMC   *Bangalore, India*

RESEARCH SOFTWARE ENGINEER II   *Aug 2019 - May 2020*

- I led the design and development of security features of Dell's Identity and Access Management product
- Implemented a bot detection filter that uses a game-theoretic approach to identifying malicious attempts performed from headless devices (without browser activity).
- Formulated a novel framework to design adaptively robust Completely Automated Reverse Turing Tests that learn on the fly and do not require periodic manual design. The model uses Bayesian inference to learn the preferences of human users and custom deep adversaries and is used on Dell login pages, globally.

Research Software Engineer I *July 2018 - Aug 2019*

- I built machine learning models to enhance the robustness of Dell's Identity and Access Management product
- Delivered a behavioral-based authentication system that classifies browser activity as being done by a human or by a bot. It is built using an auto-associative neural network, trained on client biometrics such as keystrokes, click patterns and mouse dynamics and is used on Dell login pages, globally
- Created a product traffic forecaster using a Recurrent Neural Network trained on activity logs of the product, to automate the continuous evaluation of product traffic. Insights from the forecaster have been used to alert anomalous behavior, such as adversarial action or deteriorating product health.

Publications

Conference Proceedings

Falaah Arif Khan, Eleni Manis, and Julia Stoyanovich, "Towards Substantive Conceptions of Algorithmic Fairness: Normative Guidance from Equal Opportunity Doctrines", 2nd ACM conference on Equity and Access in Algorithms, Mechanisms, and Optimization (EAAMO 2022)

Falaah Arif Khan, Eleni Manis, and Julia Stoyanovich, "Translational tutorial: Fairness and Friends", 4th ACM Conference on Fairness, Accountability, and Transparency (FAccT 2021)

Falaah Arif Khan, Sajin Kunhambu, Kalyan Chakravarthy G. (2019) "Behavioral Biometrics and Machine Learning to Secure Website Logins". In: Security in Computing and Communications (SSCC 2018). Communications in Computer and Information Science, vol 969

Journal Papers

Alene Kellogg Rhea, Kelsey Markey, Lauren D'Arinzo, Hilke Schellmann, Mona Sloane, Paul Squires, Falaah Arif Khan, and Julia Stoyanovich, "An External Stability Audit Framework to Test the Validity of Personality Prediction in AI Hiring." Data Mining and Knowledge Discovery (2022)

Patents

Falaah Arif Khan and Hari Surender Sharma. Framework to Design Completely Automated Reverse Turing Tests. US Patent 16/828520, filed March 24, 2020 and US Patent (Provisional) 62/979500, filed February 21, 2020. Assignee: Dell Technologies Pvt Ltd

Falaah Arif Khan, Tousif Mohammed, Subham Gupta, Hung Dinh, Ramu Kannapan. Event-Based Search Engine, US Patent 16/752775, filed January 27, 2020. Assignee: Dell Technologies Pvt Ltd

Falaah Arif Khan, Sajin Kunhambu, Kalyan Chakravarthy G. Behavioral Biometrics and Machine Learning to secure Website Logins. US Patent 16/257650, filed January 25, 2019. Assignee: Dell Technologies Pvt Ltd

Peer-Reviewed Workshop Publications

Falaah Arif Khan, Eleni Manis, and Julia Stoyanovich, "Fairness and Friends". Data, Responsibly Comic Series, Volume 2, 2021. Rethinking ML Papers Workshop, ICLR 2021 [Online]. Available: https://dataresponsibly.github.io/comics

Falaah Arif Khan and Abhishek Gupta. "Decoded Reality", Resistance AI Workshop, NeurIPS 2020 [Online]. Available: https://ai-ethics.github.io/decoded-reality/intro.html

Falaah Arif Khan and Julia Stoyanovich. "Mirror, Mirror". Data, Responsibly Comics, Volume 1, 2020. Resistance AI Workshop, NeurIPS 2020 [Online]. Available: https://dataresponsibly.github.io/comics/

Scientific Comics and Popular Press

Falaah Arif Khan and Zachary C. Lipton. "Superheroes of Deep Learning, Volume 2: Machine Learning for Healthcare" (2021) [Online]. Available: https://github.com/acmi-lab/superheroes-deep-learning/

Julia Stoyanovich and Falaah Arif Khan. "We are AI". We are AI Comic Series, Volume 5 (2021) [Online]. Available: https://dataresponsibly.github.io/we-are-ai/comics/

Julia Stoyanovich and Falaah Arif Khan. "All about that Bias". We are AI Comic Series, Volume 4 (2021) [Online]. Available: https://dataresponsibly.github.io/we-are-ai/comics/

Julia Stoyanovich and Falaah Arif Khan. "Who lives? Who dies? Who decides?". We are AI Comic Series, Volume 3 (2021) [Online]. Available: https://dataresponsibly.github.io/we-are-ai/comics/

Julia Stoyanovich and <u>Falaah Arif Khan</u>. "Learning from Data". We are AI Comic Series, Volume 2 (2021)
  [Online]. Available: https://dataresponsibly.github.io/we-are-ai/comics/

Julia Stoyanovich and <u>Falaah Arif Khan</u>. "What is AI?". We are AI Comic Series, Volume 1 (2021)
  [Online]. Available: https://dataresponsibly.github.io/we-are-ai/comics/

<u>Falaah Arif Khan</u> and Zachary C. Lipton. "Superheroes of Deep Learning, Volume 1: Machine Learning Yearning" (2020)
  [Online]. Available: https://github.com/acmi-lab/superheroes-deep-learning/

<u>Falaah Arif Khan</u>. "Meet AI" (2020), in AAAI Interactive Magazine
  [Online]. Available: https://interactiveaimag.org/columns/articles/comic/meet-ai-comic-vol-1-ed-2/

Teaching Experience

Fall 2017	**Basics of Electrical and Electronic Circuits**, Teaching Assistant	
Fall 2017	**Digital Electronics**, Teaching Assistant	
Spring 2017	**Mathematical Methods**, Student Tutor	

Awards & Fellowships

2021-26 **Data Science Fellowship**, New York University, Center for Data Science

Sept 2020 **Innovation of the Month**, Government Technology and MetroLab Network.
"Comic Book Bridges Gap Around Education in AI, Ethics"
https://metrolabnetwork.org/projects/innovation-of-the-month/

Aug 2019 **Game Changer Award**, Office of the CIO, Dell EMC
"For outstanding innovation in the security features of the Dell Access and Identity
Management Product"

March 2019 **Long Term Investment Award**, Dell EMC

2014-18 **Category 'A' Scholarship**, Shiv Nadar University
100% Scholarship/ complete waiver of tuition fees

Presentations, Workshops, Talks

Invited Talks

June 2022. *"It's funny because it's true - confronting scientific catechisms"*. D&I Talk, ACM DEBS 2022.

February 2022. *"Fairness as Equal Opportunity"*. Guest Lecture: Responsible Data Science, Center for Data Science, New York University.

April 2021. *"It's funny because it's true - confronting ML catechisms"*. Invited Talk: Rethinking ML Papers Workshop, ICLR'21.

March 2021. *"Fairness and Friends"*. Guest Lecture: Responsible Data Science, Center for Data Science, New York University.

Nov 2020. *"Ethics in AI"*. Panelist : Ethics in AI Panel by the McGill AI Society

Nov 2020. *"Decoded Reality: Ethics in AI"*. Invited talk: TechAide Montreal AI4Good Conference and Hackathon.

Nov 2020. *"Data, Responsibly"*. Invited speaker: Rutgers IIPL Algorithmic Justice Webinar.

Facilitated Workshops

June 2022. *IEEE-MDM 2022.* "Demystifying AI: Comics as a medium of scientific dissemination" (D&I Workshop)

Oct 2021. *A Better Tech.* "Demystifying AI: Comics as a vehicle for public education"

June 2021. *RightsCon.* "Demystifying AI: Comics as a vehicle for public education"

March 2021. *MozFest*. "Decoded Reality" (Community Lab)

Dec 2020. *Montreal AI Ethics Institute and RAIN-Africa*. "Perspectives on the Future of Responsible AI"

Nov 2020. *AI4Good and Montreal AI Ethics Institute*. "Privacy in AI"

Nov 2020. *Inclusive Design Research Center @ OCAD University*. Future of Work and Disability Study group