Muhammad Haroon

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EDUCATION

Ph.D. in Computer Science   2021 - Present
University of California, Davis

B.S. in Computer Science   2014 - 2018
National University of Computer & Emerging Sciences, Pakistan

EXPERIENCE

University of California, Davis   2021 - Present
Graduate Student Researcher
Advisors: Prof. Zubair Shafiq and Prof. Magdalena Wojcieszak
Research on privacy and harms associated with online systems. I design and evaluate techniques for auditing online systems and what social harms they may unintentionally pose.

Lahore University of Management Sciences   2019 - 2021
Research Associate
Advisor: Prof. Fareed Zaffar
Worked on authorship privacy preservation and NLP for news media analytics. Additionally, I worked on automating workflows for archiving historic content.

Techlogix   2018 - 2019
Software Engineer
Worked as a full-stack developer on HealthCloud - a hospital management system. I improved the nearly hour-long deployment protocol for delivering critical updates to under 10 minutes.

PUBLICATIONS

**Nudging the Recommendation Algorithm Increases News Consumption
and Diversity on YouTube**   2023
Submission in progress
Authors: **M. Haroon**, X. Yu (corr. author), E. Menchen-Trevino, M. Wojcieszak

**Auditing YouTube's Recommendation System for Ideologically Congenial, Extreme,
and Problematic Recommendations**   2023
Proceedings of the National Academy of Sciences (PNAS)
Authors: **M. Haroon**, M. Wojcieszak, A. Chhabra, X. Liu, P. Mohapatra, Z. Shafiq
[pre-print] [website] [code]

HARPO: Learning to Subvert Online Behavioral Advertising   2022
The Network and Distributed System Security Symposium (NDSS)
Authors: J. Zhang, K. Psounis, **M. Haroon**, Z. Shafiq
[paper] [code]

Avengers Ensemble! Improving Transferability of Authorship Obfuscation   2021
arXiv:2109.07028
Authors: **M. Haroon**, F. Zaffar, P. Srinivasan, Z. Shafiq
[pre-print] [code]

ONGOING RESEARCH

Auditing TikTok and YouTube Shorts Recommendations
Conducting a large-scale automated analysis to answer whether recommendations in TikTok and YouTube Shorts lead users to problematic content.

Fuzzing for Problematic Behavior in Online Systems
Leveraging software fuzzing techniques to identify problematic behavior in online systems.

AdBoretum
Developing infrastructure for a large-scale crawl of ads, recommendations, and personalized content on the web.

RESEARCH TOOLS DEVELOPED

YouTube Audit Platform
Identifies the daily top YouTube recommendations for politically left, right, and center users by automatically running several **Selenium**-based sock puppets in **Docker** containers. Web platform built using **Vue**. [website]

HARPO
Web extension that uses a A2C reinforcement learning model backend built using **PyTorch** to obfuscate the user's online profile. [code]

ResearchTube
Web extension for YouTube that subjects users to various algorithmic manipulations and observes changes to their content consumption patterns. [website]

CenterTube
A DQN reinforcement learning model implemented in **PyTorch** that monitors a user's YouTube homepage and systematically manipulates user recommendations towards moderate/neutral news content.

YENET
A Convolutional Neural Network for video frame interpolation. [code]

LUMS Digital Archive
Developed automated workflows for restoring and cataloging historic documents, and developed a platform in **AngularJS** to allow researchers easy access. [website]

YouTube/TikTok Driver
A series of libraries for programmatically interacting with YouTube, YouTube Shorts, and TikTok implemented using **Selenium** on web and **Android Debugging Bridge (ADB)** on mobile. [code]

SIDE PROJECTS *(can be found on my GitHub among other projects)*

ASL Handsigns Recognition
A Convolutional Neural Network implemented in **PyTorch** with a **Tkinter** frontend that recognizes ASL handsigns in real-time using the system webcam.

Scholar Lens
A VSCode Extension that auto-fills BibTeX entries using Semantic Scholar's API. Overleaf version in-progress.

Discord Stats Bot
Developed a Discord bot for video game statistics calculation that organically grew to over 200+ Discord servers.

INVITED TALKS + PODCASTS

Auditing Social Recommender Systems
- Politics and Computational Social Science Conference (PaCSS), Harvard University, 2022 [slides]
- Summer Institute in Computation Social Science (SICSS), University of Pennsylvania, 2022 [slides]
- The Backdrop - A Podcast by UC Davis [listen]
- UC Davis College of Engineering News [read]

Offensive Privacy to Counter AdTech Surveillance
- Nothing to Hide - A Data Privacy Podcast [listen]

SKILLS

Languages: *Python, C/C++, C#, R, Java, JavaScript, SQL, LaTeX*

Platforms/Frameworks: *Docker, Selenium, Git, Node.js, Vue, Android Debugging Bridge (ADB)*

Libraries: *PyTorch, SciPy, spaCy, BeautifulSoup, Pandas, Scikit-learn, Matplotlib, Seaborn, Plotly, Tkinter*

TEACHING EXPERIENCE

ECS 152A: Computer Networks
Teacher's assistant responsible for designing and conducting weekly discussion sessions, and lectures.

AWARDS & HONORS

GGCS Summer Research Fellowship ($18,000)   2023
University of California, Davis

GGCS Spring Research Fellowship ($7,177)   2023
University of California, Davis

Dean's Honor List   2018
National University of Computer & Emerging Sciences, Pakistan

REFERENCES

Zubair Shafiq
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Associate Professor of Computer Science
Lahore University of Management Sciences
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Magdalena Wojcieszak
Associate Professor of Communication
University of California, Davis
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Konstantinos Psounis
Professor of Electrical and Computer Engineering and
Computer Science
University of Southern California
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