Hafiz Asif | Curriculum Vitae

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Education

Ph.D. in Information Technology
Rutgers University, New Jersey, USA *2014–2021*
Dissertation Topic: "Privacy or Utility? How to Preserve Both in Outlier Analysis"
Advisors: Jaideep Vaidya and Periklis A. Papakonstantinou

B.S. Computer Science
Lahore University of Management Sciences (LUMS), Lahore, Pakistan *2010–2014*

Professional Experience

Assistant Professor
Hofstra University, New York City, USA *Fall 23 -*

Post-Doctoral Associate
Rutgers Institute for Data Science, Learning, and Applications, New Jersey, USA *2021 - present*
Research and development of fair, privacy-preserving, and practically-useful learning and analytics solutions for healthcare and bioinformatics domain

Research Fellow
INRIA (the National Institute for Research in Digital Science and Technology), France *2021*
Research was focused on solving privacy-preserving machine learning and data analytical problems

Summer Internship
7 Vals, Lahore Pakistan *2012*
Responsibility: document the security & privacy issues of (then emerging) NFT technology and its use in smartphones

Publications

Selected Publications

- *"Preserving Missing Data Distribution in Synthetic Data"*
  Xinyue Wang, **Hafiz Asif**, Jaideep Vaidya
  The ACM Web Conference (**WWW**), 2023

- *"A Study of Users' Privacy Preferences for Data Sharing on Symptoms-Tracking/Health App"*
  Hafiz Asif and Jaideep Vaidya
  20th Workshop on Privacy in the Electronic Society (**WPES** '22, included in the CCS '22 proceedings)

- *"Intelligent Pandemic Surveillance via Privacy-Preserving Crowdsensing"*
  Hafiz Asif, Periklis Papakonstantinou, Stephanie Shiau, Vivek Singh, Jaideep Vaidya
  IEEE Intelligent Systems, 2022

- *"Privacy Attitudes and COVID Symptom Tracking Apps: Understanding Active Boundary Management by Users"*
  Jinkyung Park, Eiman Ahmed, **Hafiz Asif**, Jaideep Vaidya, Vivek Singh
  International Conference on Information (**iConference**), 2022

- *"Identifying Anomalies while Preserving Privacy"*
  Hafiz Asif, Periklis A. Papakonstantinou, and Jaideep Vaidya
  IEEE Transactions on Knowledge and Data Engineering (**TKDE**), 2021

- *"A Guide to Private Outlier Analysis"*
  Hafiz Asif, Periklis A. Papakonstantinou, and Jaideep Vaidya
  IEEE Letters of the Computer Society (**LOCS**), 2020

- *"How to Accurately and Privately Identify Anomalies"*
  Hafiz Asif, Periklis A. Papakonstantinou, and Jaideep Vaidya
  ACM Conference on Computer and Communications Security (**CCS**), 2019

Other Publications

- *"Secure and Efficient k-NN Queries"*
  Hafiz Asif, Jaideep Vaidya, Basit Shafiq, and Nabil Adam
  IFIP International Conference on ICT Systems Security and Privacy Protection (**IFIP-SEC**), 2017

- *"Collaborative Differentially Private Outlier Detection for Categorical Data"*
  Hafiz Asif, Tanay Talukdar, Jaideep Vaidya, Basit Shafiq, and Nabil Adam
  IEEE International Conference on Collaboration and Internet Computing (**CIC**), 2016

- *"A Privacy-Sensitive Collaborative Approach to Business Process Development"*
  Hassaan Irshad, Basit Shafiq, Jaideep Vaidya, M. Ahmed Bashir,
  Hafiz Asif, Sameera Ghayyur, Shafay Shamail, and Nabil Adam
  International Conference on E-Business and Telecommunications (**ICETE**), 2015

Under Preparation (manuscript available at request)

- *"Computing Accurate Differentially Private Statistics over Spatial-Data Stream via Minimally Thick $\mathbb{Z}$-Covering Interval Families"*
  Hafiz Asif, Endre Boros, and Jaideep Vaidya

- *"How Missing Data and its Treatment Affects Fairness"*
  Sitao Min, **Hafiz Asif** and Jaideep Vaidya

- *"Stronger Security by Data-Duplication: Secure and Efficient Information Retrieval in the Presence of Covert Adversary"*
  Hafiz Asif and Jaideep Vaidya

Patents

"METHODS AND SYSTEMS FOR IMPROVED ANOMALY IDENTIFICATION THROUGH PRIVACY- ENHANCED TWO-STEP FEDERATED LEARNING" (RU Docket 2023-131)
U.S. Provisional Application 63/496,844 on April 18, 2023 *April, 2023*

"GENERATING SYNTHETIC DATA" (RU Docket 2022-158)
U.S. Provisional Application 63/405,687 on September 12, 2022 *Sep, 2022*

Systems

Privacy-Enhancing Two-Step Federated Learning for Anomaly Detection
US-UK PETs Prize Challenge Winner *available at:* [`https://github.com/idsla/Scarlet-PETs`] *2023*
They system enables multiple institutions to collaboratively learn an anomaly detection model (e.g., to identify anomalous transactions) from their federated/distributed data while preserving privacy. It uses a novel secure and privacy-preserving encoding of the features (federated across parties) and augment them to training data.

Covid Nearby, a Privacy-Preserving Symptoms Crowdsensing and Reporting
Supported by NSF, NIH, and Rutgers University [`https://covidnearby.org`] *2020*
At the outset of the COVID-19 pandemic, the population testing was low, which led to the lack of crucial information needed to track the spread of the virus in communities. Thus, to generate real-time information about the spread of the virus, in a multi-school collaborative effort, designed a powerful privacy-preserving COVID-19 symptoms crowdsensing and reporting system, and through a fast-paced development, deployed it via a suite of web, Android, and iOS apps for the public use as well as research.

Teaching

Lecturer
Cybersecurity, Rutgers University, New Jersey, USA *Fall 2018*

Teaching Assistant
Rutgers University, New Jersey, USA *2014–2018*
Data Privacy, Information Security, Data Mining, Databases, Introduction to Programming.

Summer School Instructor for Data Privacy
Center for Information Management, Integration and Connectivity, New Jersey, USA *2015 & 2016*

Teaching Assistant and Lab Instructor
Lahore University of Management Sciences (LUMS), Lahore, Pakistan *2012–2014*
Advanced Programming, Computational Problem Solving, Operating Systems, and Calculus

Seminars, Talks, and Other Activities

- *Privacy-Preserving Feature Mining and Encoding using Set Membership* 2023
  - Inpher: Privacy Preserving Machine Learning and Analytics Pioneer, USA
- *Two-Step Federated Privacy-Preserving Learning for Anomaly Detection* 2023
  - Future of Privacy Forum (think tank), USA
- *SAFE Data Analytics* 2023
  - Hofstra University, NYC, USA
- *Privacy-Preserving Data Analytics* 2022
  - IEEE Computational intelligence Society (CIS) Summer School on "*Research Trends in Artificial Intelligence and Machine Learning for Engineering Challenges*", at: Malaviya National Institute of Technology Jaipur, India
- *Users' Privacy Predilections on Symptoms-Tracking Apps* 2022
  - Workshop on Privacy in the Electronic Society (WPES) 2022, Los Angeles, USA
- *Accurately and Privately Reporting Crowdsensed COVID-19 Data* 2021
  - AMIA (American Medical Informatics Association) Annual Symposium, San Diego, USA
- *Workshop for Security, Privacy, and Ethics in Health and Biomedical Research* 2021
  - Online, USA
- *The Pandemic Research for Preparedness and Resilience (PREPARE) Workshop* 2020
  - Online, USA
- *Sensitive Privacy – An Intricate Balance of Privacy and Utility for Outlier Queries* 2020
  - INRIA, Palaieau, France
  - IBM Thomas J. Watson Research Center, New York, USA
- *How to Accurately and Privately Identify Anomalies* 2019
  ACM Conference on Computer and Communications Security (CCS), London, UK
- *How to Think about Privacy for Outlier Analysis* 2019
  CS department, Lahore University of Management Sciences, Pakistan
- *Outlier Detection and Privacy* 2018
  The New York Colloquium on Algorithms and Complexity (NYCAC), CUNY, USA

Research Fellowships

Research Assistant
Rutgers University, New Jersey, USA *2018–2020*

Research Associate
Center for Information Management, Integration and Connectivity, New Jersey, USA *2014–2018*

Research Assistant
Lahore University of Management Sciences, Lahore, Pakistan *2013–2014*

Distinctions and Fellowships

- Winner of the US-UK Privacy Enhancing Technologies (PETs) Prize Challenge *2023*
  - Developed a federated learning system for anomaly detection (announced at the White House)
- Graduate Assistanceship (Rutgers University) *2014-2020*
- Recipient of:
  - Competitive National Outreach Program's fellowship award by LUMS *2010-2014*
  - BAF fellowship award by the Babar Ali Foundation, Pakistan *2010-2014*
  - Competitive PEEF scholarship award by the provincial govt. of Pakistan *2009-2014*
- Nationwide ranked $\mathbf{1}^{st}$ in admission exams of GIKI & PIEAS, prestigious Pakistani universities *2010*

Grants

- Experience with grant writing:
  - Co-wrote and submitted NIH R01 proposal for $1.5 million over 5 years (under revision) 2022
  - Co-wrote a successful NSF RAPID Grant for privacy-preserving crowdsensing of COVID-19 for ∼$200K 2020
- Recipient of travel grants by:
  - ACM Conference on Computer and Communications Security (**CCS**) *2019*
  - IEEE International Conference on Collaboration and Internet Computing (**CIC**) *2016*
- Recipient of Dean's Summer Research Grant (Rutgers Business School) *2015 & 2016*

Professional Service

- Publicity Chair for Conference on Data and Applications Security and Privacy 2022 (DBSec'22)
- Organized the Workshop for Security, Privacy, and Ethics in Health and Biomedical Research
- *Program Committee Member* for: The ACM Web Conference (*WWW*), Data and Applications Security and Privacy (*DBSec*), European Symposium on Research in Computer Security (*ESORICS*), Workshop on Privacy in the Electronic Society (*WPES*, affiliated with CCS), AI for Cybersecurity (affiliated with AAAI)
- *Reviewer* for: Association for the Advancement of Artificial Intelligence (*AAAI*), Conference on Knowledge Discovery and Data Mining (*KDD*), Conference on Data and Application Security and Privacy , International Conference on Distributed Computing Systems (*ICDCS*), and International Symposium on Algorithms and Computation (*ISAAC*)

Media Mentions

- "Rutgers Business School researchers win international privacy enhancing technologies challenge"
- "Privately Identify and Help Track the Spread of COVID-19 with COVID Nearby", IEEE Computer Society
- "Tracking COVID-19 with a new app that assures user privacy", RBS News and New Jersey Alliance for Clinical and Transnational Science