Vinith Menon Suriyakumar

Last Updated	March 2022
Contact Information	*Email:* vinithms@mit.edu *Website:* VMS-6511.github.io
Research Interests	**Areas:** Machine Learning, Algorithms, Cryptography **Topics:** Differential Privacy, Algorithmic Fairness, Optimization & Sampling **Applications:** Healthcare & Social Inequality

Education

Massachusetts Institute of Technology, Boston, Massachusetts, USA

Department of Electrical Engineering and Computer Science
Ph.D., Computer Science, September 2021 - Present
Advisors: Dr. Ashia Wilson and Dr. Marzyeh Ghassemi
Collaborators: Dr. Om Thakkar
Affiliations: CSAIL, LIDS, IMES, Broad Institute

University of Toronto, Toronto, Ontario, Canada

Department of Computer Science
M.S., Computer Science (Machine Learning), Sept 2019 - June 2021
GPA: 3.93/4.00
Focus: Differential Privacy and Algorithmic Fairness in Machine Learning for Healthcare
Advisors: Dr. Marzyeh Ghassemi, Dr. Nicolas Papernot, Dr. Anna Goldenberg, Dr. Berk Ustun
Affiliations: Vector Institute, The Hospital for Sick Children

Queen's University, Kingston, Ontario, Canada

School of Computing
B.Computing., Biomedical Computing, May, 2019
GPA: 4.14/4.30 (Overall), 4.30/4.30 (Major)
Thesis: Deep Classification and Generative Models for Prostate Cancer MRIs
Advisors: Dr. Gabor Fichtinger & Dr. Parvin Mousavi
Affiliations: Kingston Health Sciences Centre

Honors and Awards

Wellcome Trust Fellowship, MIT, September 2021

Ethics of AI Graduate Research Fellowship, University of Toronto, August 2020

Vector Institute Research Grant, April 2020

Mitacs Accelerate Research Fellowship, December 2019

University of Toronto Arts and Science Fellowship, September 2019

Queen's University: Graduated Dean's Honor List with Distinction, June 2019

NSERC Industrial Undergraduate Research Award, August 2017

1st Degree Black Belt in Karate, October 2010

Conference Publications

Suriyakumar, V.M., M. Ghassemi*, B. Ustun*. 2022. When Personalization Harms: Reconsidering the Use of Group Attributes in Prediction, ICML 2022 (in submission). * denotes equal supervision

Amid, E., A. Ganesh, R. Matthews, S. Ramaswamy, S. Song, T. Steinke, V.M. Suriyakumar, O. Thakkar, A. Thakurta. 2021. Public Data-Assisted Mirror Descent for Private Model Training,

ICML 2022 (in submission). (alphabetical order)

Dziedzic, A., C.A. Choquette-Choo*, N.Dullerud*, V.M. Suriyakumar*, A.S. Shamsabadi, N. Papernot, S. Jha, X. Wang. 2021. Private Multi-Winner Voting for Machine Learning, Usenix 2022 (in submission). * denotes equal contribution

Chang, A., V.M. Suriyakumar*, A. Moturu*, J. Tu, N. Tewattanarat, S. Joshi, A. Doria, and A. Goldenberg. 2021. Unsupervised Cancer Detection from Pediatric WbMRI Volumes, RSNA 2021 (in submission). * denotes equal contribution

Suriyakumar, V.M., N. Papernot, A. Goldenberg, and M. Ghassemi. 2020. Chasing Your Long Tails: Differentially Private Prediction in Health Care Settings, ACM FAccT 2021 (Accepted).

Cheng, V., V.M. Suriyakumar, N. Dullerud, S. Joshi, and M. Ghassemi. 2020. Can You Fake It Until You Make It?: Impacts of Differentially Private Synthetic Data on Downstream Classification Fairness, ACM FAccT 2021 (Accepted).

Chang. A*, V.M. Suriyakumar*, A. Moturu*, N. Tewattanarat, A. Doria, and A. Goldenberg. 2020. Using Generative Models for Pediatric wbMRI. Medical Imaging in Deep Learning 2020. * denotes equal contribution.

Suriyakumar, V.M., R. Xu, C. Pinter, G. Fichtinger. Open-source software for collision detection in external beam radiation therapy. 2017. SPIE: Journal of Medical Imaging 2017, 10135-51.

Preprints

Chang, A., V.M. Suriyakumar*, A. Moturu*, J. Tu, N. Tewattanarat, S. Joshi, A. Doria, and A. Goldenberg. 2021. Incorporating 3D Context to Unsupervised Cancer Detection in Pediatric WbMRI. * denotes equal contribution

Books & Chapters

Differential Privacy and Medical Data Analysis, Differential Privacy for Artificial Intelligence Applications. Now Publisher Inc. Suriyakumar, V.M., N. Papernot, A. Goldenberg, and M. Ghassemi. 2021. (Forthcoming)

Invited Talks

Chasing Your Long Tails: Differentially Private Prediction in Health Care Settings, Ethics of AI in Context: Emerging Scholars, Centre for Ethics, University of Toronto, October 2020

Chasing Your Long Tails: Differentially Private Prediction in Health Care Settings, Vector Institute, University of Toronto, October 2020

Skills

Data Processing Frameworks: Pandas, Numpy
Machine Learning Frameworks: Tensorflow, PyTorch
ML DevOps Frameworks: Weights and Biases, Tensorboard
Languages: Python, Java

Papers in Preparation

Inequity of Data Markets
with Ashia Wilson

Structural Inequalities in US Organ Transplant and Procurement Processes
with Hammaad Adam, Ashia Wilson, and Marzyeh Ghassemi.

Differential Privacy and Robustness to Dataset Shift
with Neha Hulkund and Marzyeh Ghassemi.

Mentoring and Advising

Neha Hulkund, Undergraduate Researcher, Spring 2021 - Present

Shrey Jain, Undergraduate Researcher, Summer 2020 - Winter 2021

Victoria Cheng, Undergraduate Researcher, Summer 2020

Reviewing

Program Committee, IJCAI 2020 AI for Social Good Workshop
Program Committee, NeurIPS 2020 Machine Learning for Health Workshop
External Reviewer, USENIX Security 2021
Reviewer, Journal of Artificial Intelligence Research, 2021
External Reviewer, ICML 2021
External Reviewer, NeurIPS 2021
Reviewer, NeurIPS 2021 Datasets and Benchmarks Track
Reviewer, Journal of Privacy and Confidentiality
Program Committee, FAccT 2022
Reviewer, ICML 2022

Selected Professional Experience

Google, Remote

Student Researcher **Starting May 2022**

I will be working with Dr. Peter Kairouz and Dr. Galen Andrew on the intersection of differential privacy and federated learning.

Google, Remote

Research Intern **May 2021 - August 2021**

Building new algorithms to improve the utility of differentially private federated learning using public data with Dr. Om Thakkar, Swaroop Ramaswamy and collaborators at Google Brain Privacy and Security.

The Hospital for Sick Children, Toronto, Ontario Canada

Research Assistant **May, 2019 - May 2021**

Building anomaly detection methods using generative models for early detection of pediatric cancer in whole body MRIs. This project is in collaboration with clinicians in the SickKids' Radiology department.

Cape Privacy (formerly Dropout Labs), Remote

Consultant **June, 2019 - August, 2019**

Contributed tutorials to the open-source library TF Encrypted for machine learning under secure multiparty computation protocols. Started investigations into using self-learning activation functions using polynomial approximations to speed up training time.

Square, San Francisco, California USA

Data Science Intern **May, 2018 - August, 2018**

Developed a representation learning algorithm to cluster merchants into different business categories for improved pricing algorithms with 90% accuracy. Involved in ethics and governance of AI in products committee analyzing what Square's principles would be when implementing AI into its products.

Helpful (acquired by Shopify), Toronto, Ontario Canada

Machine Intelligence Intern **September, 2017 - April, 2018**

Improved transcriptions for speech recognition problems such as getting names and company specific jargon correct by 4-10x. Investigated computational linguistic techniques such as phoneme matching and pronunciation modelling to further improve transcriptions in the presence of different accents.

IBM, Toronto, Ontario Canada

Deep Learning and Systems Research Intern **May, 2017 - August, 2017**
Led a research project exploring improvements to traditional query optimization in databases using machine learning. Implemented a few shot learning algorithm based on matching networks improving the database speed by 30% across standard SQL query speed benchmarks. Currently, I have 1 patent pending from this work.

Service and Volunteering

VP Visit Days & Orientation, MIT EECS Graduate Student Association January 2022 - Present

Director of Finance & Advisor, CUSEC **January 2019 - February 2021**
I manage a budget of approximately $100,000 for a nationwide software engineering conference of 500 students. The conference brings over 15 industry sponsors and 20 speakers from all over North America to Montreal for three days to engage in a variety of topics in software engineering. I advise the chairs and the conference organizers on best practices.

NeurIPS 2019 Student Volunteer **December 2019**
I was selected to be a student volunteer in helping run this premier machine learning research conference that brings over 12 000 researchers from all over the world. My role involved organizing attendees into different lectures and paper presentations.

Co-Chair, Toronto Health Data Hackathon **September 2019 - October 2019**
I led a team of 5 to organize this important hackathon in collaboration with the Vector Institute and St. Michael's Hospital. The event gathered 100 computer scientists and doctors to build new machine learning for health products over the course of two days.

Chair, QHacks **April 2018 - February 2019**
I lead a team of 17 students to create a 500 person hackathon to engage and empower students to build products and connect with the tech industry. I developed a sustainable internal operating structure focusing on team autonomy and transparency. Provided bi-weekly mentorship to each individual to ensure important growth in desired areas. I ran discussions on gender and racial discrimination in tech and how we as an organization can support these marginalized groups.

Co-Chair, CUSEC **January 2018 - January 2019**
I lead a team of 25 students remotely to create a 500 person conference to engage and empower students to explore different areas of the software engineering industry. I improved engagement across a number of Canadian universities and engaged a more diverse set of speakers so gender, racial, and sexual orientation representation were present. Provided bi-weekly mentorship to each individual to ensure important growth in desired areas.

Director of Events, CUSEC **January 2017 - January 2018**
I managed and executed the logistics for five different events and 12 different workshops at the scale of 500 attendees. Led the pilot of a new event to increase engagement between students about pressing issues of gender and racial discrimination.

VP Operations, Queen's Computing Students' Association **March 2017 - April 2018**
I hired, led, and supported a team of 7 commissioners who lead efforts in academics, casual events, formal events, marketing, finance, equity and governance. Restructured our hiring process to reduce biases and improve equity. I piloted a first year internship program within the association which increased first year student engagement by 50%.