

Vinith Menon Suriyakumar

LAST UPDATED	August 2021
CONTACT INFORMATION	<i>Email:</i> vinithms@mit.edu <i>Website:</i> VMS-6511.github.io
RESEARCH INTERESTS	Areas: Machine Learning, Optimization, & Theoretical Computer Science Topics: Differential Privacy, Algorithmic Fairness, Learning Theory Applications: Healthcare & Social Inequality
EDUCATION	Massachusetts Institute of Technology , Boston, Massachusetts, USA Department of Electrical Engineering and Computer Science Ph.D., Computer Science, Starting September 2021 Advisors: Dr. Ashia Wilson and Dr. Marzyeh Ghassemi Affiliations: CSAIL, LIDS, IMES 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	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
ACADEMIC EXPERIENCE	University of Toronto , Toronto, Ontario Canada <i>Graduate Student</i> September, 2019 - June, 2021 Includes current Masters level coursework and research projects. Courses: Machine Learning, Neural Networks and Deep Learning, Probabilistic Learning and Reasoning, Ethics of AI in Context <i>Teaching Assistant</i> September, 2019 - December 2020 Duties at various times have included office hours, assignment and exam marking, assignment de-

velopment, and holding tutorials. Courses: Introduction to Databases, Introduction to Artificial Intelligence, and Capstone Design Project.

Queen’s University, Kingston, Ontario Canada

Research Assistant

September, 2017 - May, 2019

Worked in biomedical engineering lab developing generative models to improve MRI image quality from 1.5T to 3.0T for improving image quality in developing / rural regions. Developed classification models using neural networks to detect cancer lesions in prostate MRIs. Worked on combination of graphics and HCI research developing open source treatment planning visualization system with over 10 000 downloads worldwide.

Peer Tutor

September 2016 - May 2017

Individualized tutoring for students in introductory computer science courses such as discrete mathematics and introduction to programming.

CONFERENCE
PUBLICATIONS

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

Dziedzic, A., C.A. Choquette-Choo*, N.Dullerud*, V.M. Suriyakumar*, A.S. Shamsabadi, N. Papernot, S. Jha, X. Wang. 2021. Multi-Label Confidential and Private Collaborative Learning, NeurIPS 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.

WORKSHOP
PUBLICATIONS

Suriyakumar, V.M., N. Papernot, A. Goldenberg, and M. Ghassemi. 2020. The Challenges of Differentially Private Prediction in Healthcare, NeurIPS 2020 Privacy Preserving Machine Learning Workshop (Accepted).

Suriyakumar, V.M., N. Papernot, A. Goldenberg, and M. Ghassemi. 2020. The Pitfalls of Differentially Private Prediction in Healthcare, Theory and Practice of Differential Privacy 2020 (Accepted).

Suriyakumar, V.M., R. Xu, C. Pinter, G. Fichtinger. Collision detection for external beam radiation therapy applications in SlicerRT. 2017. Imaging Network Ontario Conference.

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, MICCAI 2021 (in submission). * denotes equal contribution

BOOKS CHAPTERS

Differential Privacy and Medical Data Analysis, Differential Privacy for Artificial Intelligence Applications. 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	<p>Data Processing Frameworks: Pandas, Numpy</p> <p>Machine Learning Frameworks: Tensorflow, PyTorch</p> <p>ML DevOps Frameworks: Weights and Biases, Tensorboard</p> <p>Languages: Python, Java</p> <p>Markup: LaTeX, Markdown</p>
PAPERS IN PREPARATION	Incompatibility of Algorithmic Fairness Techniques and Differential Privacy In collaboration with Taylor Killian, Ali Shahin Shamsabadi, Nicolas Papernot, Anna Goldenberg, and Marzyeh Ghassemi.
	Fair Use Violations: Failure Modes and Pervasiveness In collaboration with Berk Ustun and Marzyeh Ghassemi.
	Stochastic Adaptive Gradient Boosting Machines In collaboration with Ashia Wilson.
	Understanding Inequity in Organ Transplant Pipelines In collaboration with Hammaad Adam, Ashia Wilson, 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	<p>Program Committee, IJCAI 2020 AI for Social Good Workshop</p> <p>Program Committee, NeurIPS 2020 Machine Learning for Health Workshop</p> <p>External Reviewer, USENIX Security 2021</p> <p>Reviewer, Journal of Artificial Intelligence Research, 2021</p> <p>External Reviewer, ICML 2021</p> <p>External Reviewer, NeurIPS 2021</p> <p>Reviewer, NeurIPS 2021 Datasets and Benchmarks Track</p> <p>Reviewer, Journal of Privacy and Confidentiality</p>
SELECTED PROFESSIONAL EXPERIENCE	<p>Google, Remote</p> <p><i>Research Intern</i> May 2021 - Present Building new algorithms to improve the utility of differentially private learning with Dr. Om Thakkar, Swaroop Ramaswamy and collaborators at Google Brain Privacy and Security.</p>
	<p>The Hospital for Sick Children, Toronto, Ontario Canada</p> <p><i>Research Assistant</i> 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.</p>

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

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%.