

Vinith M. Suriyakumar

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Website: [VMS-6511.github.io](https://github.com/VMS-6511)

RESEARCH INTERESTS **Areas:** Machine Learning, Theoretical Computer Science
Topics: Differential Privacy, Algorithmic Fairness, Distributional Robustness
Applications: Healthcare & Social Welfare

EDUCATION **University of Toronto**, Toronto, Ontario Canada
 Department of Computer Science
 M.S., Computer Science (Machine Learning), Sept 2019 - Present
 GPA: 3.90/4.00
 Focus: Differential Privacy and Algorithmic Fairness in Machine Learning for Healthcare
 Advisors: Dr. Marzyeh Ghassemi, Dr. Nicolas Papernot, Dr. Anna Goldenberg
 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 Models for Prostate Cancer MRIs
 Advisors: Dr. Gabor Fichtinger & Dr. Parvin Mousavi
 Affiliations: Kingston Health Sciences Centre

HONORS AND AWARDS	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	University of Toronto , Toronto, Ontario Canada	
EXPERIENCE	<i>Graduate Student</i>	September, 2019 - Present
	Includes current Masters level coursework and research projects. Courses: Machine Learning, Neural Networks and Deep Learning, Probabilistic Learning and Reasoning	

Teaching Assistant **September, 2019 - present**
 Duties at various times have included office hours, assignment and exam marking, assignment development, 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.

PUBLICATIONS

Suriyakumar, V.M., N. Papernot, A. Goldenberg, and M. Ghassemi. 2020. Effects of Long Tails on Differentially Private Prediction in Healthcare Settings, NeurIPS 2020 (in submission).

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. Collision detection for external beam radiation therapy applications in SlicerRT. 2017. Imaging Network Ontario Conference.

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.

CONFERENCE PRESENTATIONS

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. (Oral)

Chang. A*, V.M. Suriyakumar*, A. Moturu*, A. Doria, and A. Goldenberg. 2019. Early pediatric cancer detection in whole-body MRIs. Evolution of Deep Learning Symposium 2019. * denotes equal contribution. (Poster)

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

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. (Oral)

Suriyakumar, V.M., R. Xu, C. Pinter, G. Fichtinger. Improving accessibility of radiation therapy software in developing countries. Canadian Undergraduate Conference on Healthcare 2017. (Oral)

PAPERS IN PREPARATION

Sharing Models and Data Safely: Differentially Private Time Series Representation Learning
In collaboration with Nicolas Papernot and Marzyeh Ghassemi.

On The Compatibility of Privacy and Fairness in Generative Models
In collaboration with Victoria Cheng, Shalmali Joshi, and Marzyeh Ghassemi.

Disparities of Personalized Machine Learning in Healthcare
In collaboration with Berk Ustun and Marzyeh Ghassemi.

Anomaly Detection for Pediatric Cancer Screening: A Multi-Site Study
In collaboration with Alex Chang, Abhishek Moturu, Nipaporn Tewattanarat, Andrea Doria, and Anna Goldenberg.

MENTORING AND ADVISING

Victoria Cheng, Undergraduate Researcher, Summer 2020

SELECTED PROFESSIONAL EXPERIENCE	The Hospital for Sick Children , Toronto, Ontario Canada	
	<i>Research Assistant</i>	May, 2019 - Present
	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	
	<i>Consultant</i>	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	
	<i>Data Science Intern</i>	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	
	<i>Machine Intelligence Intern</i>	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	
	<i>Deep Learning and Systems Research Intern</i>	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 - Present
	NeurIPS 2019 Student Volunteer	December 2019
	Co-Chair, Toronto Health Data Hackathon	September 2019 - October 2019
	Chair, QHacks	April 2018 - February 2019
	Co-Chair, CUSEC	January 2018 - January 2019
	Director of Events, CUSEC	January 2017 - January 2018
	Vice President Operations, Queen's Computing Students' Association	March 2017 - April 2018
SKILLS	Data Processing Frameworks: Pandas, Numpy	
	Machine Learning Frameworks: Tensorflow, PyTorch	
	ML DevOps Frameworks: Weights and Biases, Tensorboard	
	Languages: Python, Java	
	Markup: LaTeX, Markdown	