Vinith M. Suriyakumar

Last Updated	July 2020
Contact Information	*Phone:* (613) 612-0937 *Email:* vinith@cs.toronto.edu *Website:* VMS-6511.github.io
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 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 Experience

University of Toronto, Toronto, Ontario Canada

Graduate Student **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 Captstone 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 Predicition 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 bream 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 bream 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

Research Assistant **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

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 prinicples 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 - 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