SAFWAN HOSSAIN

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EDUCATION

University of Toronto (Vector Institute)   September 2018 - April 2020
MSc. in Computer Science
Specialization: Machine Learning, Algorithmic Game Theory
Advisor: Dr. Nisarg Shah

University of Toronto   September 2013 - June 2018
B.A.S.c in Electrical and Computer Engineering - High Honours   GPA: 3.95/4.00
Specialization: Signal Processing and Control Systems

RELEVANT COURSEWORK

Undergraduate: Robot Modelling and Control, Advanced Algorithms, Machine Learning,
Graduate: Random Processes, Deep Reinforcement Learning, Computational Linguistics,
                    Statistical Learning Theory, Algorithms for Computational Social Choice

TECHNICAL SKILLS

Modeling/Simulations   MATLAB, Mathematica
Programming Languages/Framework   Python, C/C++, pyTorch, TensorFlow, cvxpy

RECENT INDUSTRY EXPERIENCE

Cerebras Systems   August 2020 - Present
Machine Learning Engineer

I currently work as a machine learning engineer at Cerebras Systems, a company dedicated to accelerating deep learning compute by pioneering a wafer-scale approach. I work on integrating and optimizing user-defined tensorflow models to our compile stack. Independent of this, I also led a project to optimally estimate compute resources for a given model to run on our unique system.

Xanadu AI   September 2019 - December 2020
Research Intern

I was as a research intern at Xanadu AI, a photonic quantum computing firm. I worked alongside the quantum machine learning research team to investigate new hybrid (quantum-classical) computational models that offer significant advantages for both discriminative and generative tasks.

Intel   May 2016 - July 2017
Compiler Engineering PEY

As part of my profession experience year (PEY), I spent a year in the Intel PSG (formerly Altera) FPGA compiler team. I worked on optimization algorithms for routing to reduce clock skew. I also initiated and led a project that modelled clock placement as a constraint satisfaction problem which resulted in a 1.5% increase in the maximum operating frequency of the Stratix 10 FPGA.

RESEARCH INTERESTS

My research lies primarily in the intersection of algorithmic game theory, machine learning and fairness, with contributions in both applied and theoretical research. Early on, I worked on deep learning topologies and training regimes for efficient training of GANs, robust computer vision models that work well on perturbed data, and to model invertible functions (6, 8, 9). My research thereafter turned more theoretical, and I worked on two projects that rigorously characterized the role and impact adversarial data sources can have on learning models (2, 4). I also worked to build a learning-theoretic framework for fairness in machine learning by utilizing notions prevalent in economics and social choice theory (3). On applied fairness, I worked to analyze the impact of various fairness notions on clinical NLP tasks (5). I am still active in research and my recent interest is in rigorously applying notions from computational social choice and game theory to multi-agent variants of classical online and reinforcement learning problems (1).

PUBLICATIONS AND MANUSCRIPTS

1. **S.Hossain**, E. Micha, and N. Shah. *Fair Algorithms for Multi-Agent Multi-Armed Bandits.* Under review at Twenty-Second ACM Conference on Economics and Computation - EC 21.

2. **S.Hossain** and N. Shah. *The Effect of Strategic Noise on Linear Regression.* Proc. of the 19th International Conference on Autonomous Agents and Multiagent Systems - AAMAS 2020.

3. **S.Hossain**, A. Mladenovic, and N. Shah. *Designing Fairly Fair Classifiers via Economic Fairness Notions.* Proc. 29th International World Wide Web Conference - WWW 2020.

4. **S.Hossain**, E. Micha, and N. Shah. *The Surprising Power of Hiding Information in Facility Location.* Proc. of the 34th AAAI Conference on Artificial Intelligence - AAAI 2020.

5. J. Chen, I. Berlot-Atwell, **S.Hossain**, X. Wang, *Analyzing Text Specific vs Blackbox Fairness Algorithms in Multimodal Clinical NLP.* Best Paper at the 3rd Clinical Natural Language Processing Workshop at EMNLP 2020.

6. **S.Hossain** and J. Lorraine. *JacNet: Learning Functions with Structured Jacobians.* Workshop on Invertible Neural Nets and Normalizing Flows at ICML 2019

7. A. Budhkar, K. Vishnubhotla, **S.Hossain**. *Generative Adversarial Networks for Text Using word2vec Intermediaries.* Workshop on Representation Learning at ACL 2019

8. Y. Li, **S.Hossain**, K. Jamali, F. Rudzicz. *DeepConsensus: Using Consensus of Features From Multiple Layers to Attain Robust Image Classification.* Arxiv 2019

9. **S.Hossain**, K. Jamali, Y. Li, F. Rudzicz. *ChainGAN: A Sequential Approach to GANs.* Arxiv 2018

AWARDS AND DISTINCTIONS

Recipient of the Ontario Provincial Graduate Scholarship	June 2019
Recipient of the Vector Institute Scholarship in Artificial Intelligence	November 2018
Recipient of the Arts and Science Graduate Fellowship	October 2018
Recipient of the Wolfond Graduate Scholarship	September 2018
Ranked 2nd in the graduating class of Electrical Engineering	June 2018
Recipient of the University of Toronto President's scholarship	April 2014
Recipient of the Governor General's Bronze Medal	June 2013
Ranked in the Top 20 students in British Columbia	June 2013