ALIREZA FATHOLLAH POUR

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EDUCATION

McMaster University, Canada *2021 - 2022*
M.Sc. in Computer Science
GPA: 3.98 out of 4

Amirkabir University of Technology (Tehran Polytechnic), Tehran, Iran *2014 - 2019*
B.Sc. in Electrical Engineering
GPA: 3.54 out of 4

CORE COMPETENCIES

Python	C++	Java	Machine Learning	Statistical Learning (Theory)
Pytorch	Epsilon Modeling Framework	Matlab	Neural Networks	Generalization/Capacity Bounds
Keras	Tensorflow		Supervised Learning	Computer Vision

EXPERIENCE

Research Assistant *August 2021 - Present*
McMaster University, Hamilton, ON - Supervised by Hassan Ashtiani

- Investigating generalization bounds of (recurrent) neural networks and offering better designs for networks based on the magnitude/size of their parameters
- Exploring the asymmetry of datasets to understand the performance of transfer learning

Graduate Research Assistant *January 2021 - August 2022*
McMaster University, Hamilton, ON

- Studying generalization bounds and capacities of neural networks for supervised learning
- Offering a "modular design" to build complex learning algorithms out of simpler ones
- Providing a framework for studying the capacity of (random/noisy) function classes by introducing new notions of covering number with respect to distances between distributions

Undergraduate Research Assistant *January 2019 - May 2019*
Amirkabir University of Technology, Iran

- Designing optimal constellation with respect to symbol error for communication systems
- Developed by minimizing SER using deep neural networks and autoencoders

Undergraduate Research Assistant *February 2018 - May 2019*
Amirkabir University of Technology, Iran

- Bachelor's degree project: Classification of digital modulation with no prior knowledge
- Performed using machine learning techniques such as SVM and neural networks

PUBLICATIONS

A. Fathollah Pour and H. Ashtiani, "Benefits of Additive Noise in Composing Classes with Bounded Capacity", *arXiv preprint arXiv:2206.07199*, Jun. 2022
GITHUB: `https://github.com/fathollahpour/composition_noise`

HONORS AND AWARDS

Certificate of "Building Transformer-Based Natural Language Processing Applications" *June 2022*
NVIDIA Deep Learning Institute

Ranked 1st for Technical Contribution in Graduate Poster Session *April 2022*
Computing and Software Department - McMaster University

Recipient of the sMAP Graduate Scholarship *January 2021*
Smart Mobility for the Aging Populations

Awarded the title "Excellent Bachelor's Degree Student" *October 2016*
Organization of Exceptional Talents, Amirkabir University of Technology, Tehran, Iran

Awarded to Study Computer Engineering as a Second Major *September 2016*
Organization of Exceptional Talents, Amirkabir University of Technology, Tehran, Iran

Ranked 454th Among Roughly 192,000 Students in the Nationwide Universities Entrance Exam (Top 0.36 Percentile) *August 2014*

Achieved Top 100 Rank Among Roughly 55000 Participants for the NODET High School Entrance Exam *September 2009*
National Organization for Development of Exceptional Talents (NODET), Tehran, Iran

INVITED TALKS

Benefits of Additive Noise in Composing Classes with Applications to Neural Networks *July 2022*
Research talk at sMAP public symposium

PROFESSIONAL SERVICES

Reviewer for ACML 2022
Reviewer for AISTATS 2023

TEACHING EXPERIENCE

Teaching Assistant

- Theoretical Foundations of Unsupervised Learning - McMaster University *September - December 2022*
- Introduction to Machine Learning - McMaster University *January - April 2022*
- Communication Skills - McMaster University *September - December 2021*
- Communications Systems - McMaster University *January - April 2021*
- Linear Algebra - Amirkabir University of Technology *September 2018 - May 2019*

Tutoring

- High School Mathematics and Calculus - Private Tutor and Class Teacher *September 2014 - March 2016*

PROJECTS

Training Noisy Neural Networks on MNIST to Find Their Covering Numbers and Generalization Bounds *November 2021*

- Computing the Parameters of the trained Network, i.e., Number/Magnitude of Weights to Compare Several Generalization Bounds
- GITHUB: `https://github.com/fathollahpour/composition_noise`
- Python: Pytorch, CUDA

Designing fully connected networks and Convolutional Neural Networks (CNN) to denoise images from MNIST dataset *November 2021*

- Designing and training CNN and fully connected networks to reconstruct noisy images
- Python: Pytorch, CUDA

Preparing an exercise research proposal for a grant in "Mobility and Public Transport" provided by Social Sciences and Humanities Research Council of Canada *October 2021*

- Interdisciplinary project of writing an exercise research proposal including summary of research, motivation, research questions and proposed evaluation plans.

Efficiently solving an optimization problem for fitting Gaussian Mixture Models to piece-wise polynomials that are estimating unknown distributions *April 2021*

- Solved efficiently by finding a linear program to approximate the solution and applying Newton method
- MATLAB: MATLAB'S OPTIMIZATION TOOLBOX.

Building a Domain Specific Language (DSL) and an editor for machine learning tasks constituting of data processing, training, and performance evaluation *April 2021*

- Accompanied by a graphical editor which is integrated with validation, error detection, and corrections
- Eclipse Epsilon Modeling Framework: Including model to text transformation to build a Python code generator for designed machine learning models

Designing a modified pill box to help remembering the medication schedule *April 2021*

- Producing a smart pill box that is complemented with LEDs programmed by Arduino
- JAVA: The pill box is accompanied by a Java application that can save each user's personal schedule on every launch and set reminders based on their preference.

Building a Deep Neural Network for Image Classification of Mask Dataset *November 2020*

- Classification of images that contain people with mask, without mask, or a mixture of them
- Python: Keras

Designing and Optimizing the Model of an Advertiser and a Publisher *June 2020*

- Advertisers and publishers are learning in an online fashion using bandit algorithms and context generation
- Python

Channel Coding With Set-Partitioning *June 2020*

- MATLAB - Assessed by Nokia

Analyzing the Patterns of Mobile Users During the Lockdown in Milan, Italy *May 2020*

- Clustering user classes by k-Nearest Neighbours based on real data from base stations.
- Python: sci-kit learn - Analyzed data patterns are compared against a baseline provided by Google.

Programming and Building a "Normal Tanks" Game *July 2018*

- JAVA

Modeling and Designing a Lead-Lag Controller *June 2018*

- MATLAB: SIMULINK

Programming and Building a "Java Download Manager(JDM)" *May 2018*

- JAVA

Programming a "Matrix Calculator" - Detecting expression and applying calculations *March 2018*

- JAVA

Simulation of Digital Communication Systems (QAM, PSK and etc.) *December 2017*

- MATLAB

Designing an optimized array antenna using "Genetic Optimization Algorithm" *April 2017*

- MATLAB

Implementing a "Hokm" cards game *December 2014*

- Players can play with computer players, which were intelligent enough to decide the best move in each round
- C++