ALIREZA FATHOLLAH POUR

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RESEARCH INTERESTS

Deep Learning Learning Theory Capacity of Learning Algorithms Generalization in Deep Learning

EDUCATION

McMaster University, Canada *2021 - Present*
M.Sc. in Computer Science
Current research direction: Capacity of (deep) learning algorithms and proving generalization bounds for (noisy) classes of functions such as (noisy) neural networks
Supervisor: Hassan Ashtiani, PhD
Courses: Foundations of Unsupervised Learning: A+, Engineering Optimization: A+, Software Design: A, Mobility in the Aging Population I: A+, Mobility in the Aging Population II: A+

Amirkabir University of Technology (Tehran Polytechnic), Tehran, Iran *2014 - 2019*
B.Sc. in Electrical Engineering
Overall GPA based on WES scale 3.54 out of 4 (16.94 out of 20)
Last 2 year's GPA based on WES scale 3.7 out of 4 (17.64 out of 20)
GRE score: Quantitative Reasoning: 168, Verbal Reasoning: 150, Analytical Writing: 3.5

Allameh Helli High School(NODET), Tehran, Iran *2014*
Diploma in Mathematics and Physics
GPA based on WES scale 4 out of 4 (19.75 out of 20)
National Organization for Development of Exceptional Talents(NODET)

RESEARCH EXPERIENCE

Graduate Research Assistant
Research project: Studying generalization bounds for neural networks and their capacities. Introducing a new notion of covering number with respect to distances between distributions to provide a framework for studying the capacity of (random/noisy) function classes and their compositions
Supervisor: H. Ashtiani, PhD *January 2021 - Present*

Undergraduate Research Assistant
Research Project: Optimal Constellation Design by Minimizing SER Using Deep Learning and Autoencoders
Supervisor: M. Emadi, PhD *January 2019 - May 2019*

Undergraduate Research Assistant
Bachelor's Degree Project: Feature-Based Digital Modulation Classification Using Statistical Analysis and Machine Learning
Supervisor: M. Emadi, PhD *February 2018 - May 2019*

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

Awarded NVIDIA DLI certificate for successful completion of "Building Transformer-Based Natural Language Processing Applications" *June 2022*
NVIDIA Deep Learning Institute

Awarded "Executive Committee Member" *December 2016*
The Second International Conference on Signal Processing and Intelligent Systems(ICSPIS)

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

Certified for Completing "Matlab in Electrical Engineering" Course *October 2015*
Tehran Institute of Technology

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

Awarded "the Best Student Project" Among More than 60 Projects in Electrical Section *January 2011*
Allameh Helli High School 27th Seminar on Student Projects
Allameh Helli High School(NODET), Tehran, Iran

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

TEACHING EXPERIENCE

Teacher Assistant for "Introduction to Machine Learning" Course *January - April 2022*
McMaster University
Professor: H. Ashtiani, PhD

Teacher Assistant for "Communication Skills" Course *September - December 2021*
McMaster University
Professor: V. Maccio, PhD

Teacher Assistant for "Communications Systems" Course *January - April 2021*
McMaster University
Professor: W. He, PhD

Teacher Assistant for "Linear Algebra" Course *September 2018 - May 2019*
Amirkabir University of Technology
Professor: H. Atrianfar, PhD

Teaching High School Mathematics and Calculus to Prepare Individuals for Taking Nationwide Entrance Exam as a "Private Tutor" *February 2015 - March 2016*
Danesh Vahid High School

Teaching High School's 2nd Year Mathematics as a Class Teacher for a Semester

Danesh Vahid High School *September 2014 - February 2015*

PREVIOUSLY SELECTED COURSES

Advanced Programming (Java), Machine Learning (Polytechnic University of Milan(Polimi)), Data Mining (Polimi), Data Intelligence Applications (Polimi), Artificial Neural Networks and Deep Learning (Polimi), Discrete Mathematics, Data Structures and Algorithms, Database, Game Theory (Polimi), Principles and Applications of Artificial Intelligence

ACADEMIC COURSE PROJECTS

Designing fully connected networks and Convolutional Neural Networks (CNN) to denoise images from MNIST dataset *November 2021*
Trying to design and learn fully connected network and CNN in order to reconstructs images in MNIST dataset given their noisy versions. The noisy image is constructed by dropping each pixel of the original image with a certain probability.
Course: Mobility in the Aging Population I, McMaster University
Professor: H. Ashtiani, PhD

Preparing an exercise research proposal for a grant in "Mobility and Public Transpor" provided by Social Sciences and Humanities Research Council of Canada *October 2021*
Working on the interdisciplinary project of writing an exercise research proposal including summary of research, motivation, research questions and proposed evaluation plans.
Course: Mobility in the Aging Population I, McMaster University
Professor: R. Zheng, PhD

Solving an optimization problem for fitting Gaussian Mixture Models(GMMs) to piecewise polynomial distribution in an efficient setting *April 2021*
Trying to find an optimization setting for fitting GMMs to piecewise polynomials that are estimating a distribution. The problem was implemented in Matlab efficiently by finding a linear program to approximate the solution and solve the Newton method using Matlab's Optimization Toolbox.
Course: Engineering Optimization, McMaster University
Professor: T. Davidson, PhD

Building a Domain Specific Language(DSL) and an editor for machine learning tasks that involve data processing, training, and performance evaluation *April 2021*
Building a DSL using Eclip's Epsilon framework to define metamodels for machine learning tasks. Constructing a graphical editor to design models that conform to the metamodel and integrating it with validation, error detection, and corrections. Including model to text transformation to build a Python code generator for designed machine learning models.
Course: Software Design, McMaster University
Professor: R. Paige, PhD

Designing a modified pill box to help seniors remember their medication schedule *April 2021*
Producing a smart pill box that is compelemented with LEDs programmed by Arduino to remind the user of their medication schedule. The pill box is accompanied with a Java application that can save each user's personal schedule and set reminders based on their preference.
Course: Mobility in the Aging Population II, McMaster University
Professor: R. Zheng, PhD

Building a Deep Neural Network for Image Classification of Mask Dataset *November 2020*
Designing deep neural networks for classification of images that contain people with mask, without maks, or a mixture of them and to use them to compete in Kaggle with other groups.
Course: Artificial Neural Networks and Deep Learning, Polytechnic University of Milan(Polimi)

Professor: M. Matteucci, PhD

Designing and Optimizing the Model of an Advertiser and Publisher *June 2020*
Designing advertisers that compete to advertise on websites and both the advertisers and publishers are learning in an online fashion by using bandit algorithms and context generation
Course: Data Intelligence Applications, Polytechnic University of Milan(Polimi)
Professor: N. Gatti, PhD

Channel Coding With Set-Partitioning *June 2020*
Designing and implementing channel coding with partitioning the constellation into subcontellaions which was brought by Nokia
Course: Information Theory, Polytechnic University of Milan(Polimi)
Professor: M. Magarini, PhD

Analysing the Patterns of Mobile Users During the Lockdown in Milan, Italy *May 2020*
Clustering user classes and analysing their behaviour and mobility by taking into account the data patterns of base stations before and after the lockdown
Course: Mobile Radio Networks, Polytechnic University of Milan(Polimi)
Professor: A. Capone, PhD

Programming and Building a "Normal Tanks" Game Using Java *July 2018*
Using JAVA programming language
Course: Advanced Programming, Amirkabir University of Technology(Computer Engineering Department)
Lecturer: M. Ahmadpanah

Modeling and Designing a Lead-Lag Controller *June 2018*
Using MATLAB's SIMULINK and programming environment
Course: Linear Control Systems, Amirkabir University of Technology
Professor: M. Khosravi

Programming and Building a "Java Download Manager(JDM)" Using Java *May 2018*
Implementing a Download Manager similar to Interenet Download Manager(IDM) using JAVA programming language
Course: Advanced Programming, Amirkabir University of Technology(Computer Engineering Department)
Lecturer: M. Ahmadpanah

Programming a "Matrix Calculator" Using Java *March 2018*
Implementing a Matrix Calculator which can detect an input expression and apply desired calculations to matrices
Course: Advanced Programming, Amirkabir University of Technology(Computer Engineering Department)
Lecturer: M. Ahmadpanah

Designing a CMOS differential amplifier using HSPICE *February 2018*
Designed an amplifier with the 90-nm technology. Also simulated the design both in AC and transient environments
Course: Electronics III, Amirkabir University of Technology
Professor: M. Yavari, PhD

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

Using MATLAB's programing environment
Course: Communications II, Amirkabir University of Technology
Professor: M. Emadi, PhD

Designing an optimized array antenna (by using "Genetic Optimizing Algorithm") by MATLAB *April 2017*
Writing a genetic-based algorithm program with MATLAB
Course: Antenna, Amirkabir University of Technology
Professor: P. Dehkhoda, PhD

Simulating AM, FM, SSB and VSB communication systems *November 2016*
Using MATLAB's SIMULINK and programing environment
Course: Communications I, Amirkabir University of Technology
Professor: H. Beyranvand, PhD

Designing a two stage BJT amplifier using ADS *May 2016*
Satisfied all the parameters of the design by tuning different variables (resistors or capacitors) or by adding other kinds of stages to the circuit
Course: Electronics II, Amirkabir University of Technology
Professor: M. Moezzi, PhD

Implementing a "Hokm" cards game using C++ *December 2014*
Designed the algorithm and interface for a card game in which a single player can play with 3 computer players, which were intelligent enough to decide the best move in each round
Course: Programming, Amirkabir University of Technology
Professor: Pourmohammad, PhD

PROGRAMMING AND MARKUP LANGUAGES

Python including TensorFlow, Keras, and Pytorch , C++, Java, Matlab, Epsilon Modeling Framework, SQL, Gnu Radio, HSPICE, ADS, and VHDL

LANGUAGE SKILLS

English	Fluent
Persian	Native
Kurdish	Fluent
Turkish	Intermediate
German	Beginner (A1 Degree)