

ALIREZA FATHOLLAH POUR

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Department of Computing and Software, McMaster University

EDUCATION

McMaster University, Canada

January 2021 - August 2022

M.Sc. in Computer Science - GPA: 3.98/4

Advisor: Hassan Ashtiani

Amirkabir University of Technology (Tehran Polytechnic), Tehran, Iran

September 2014 - April 2019

B.Sc. in Electrical Engineering

RESEARCH INTERESTS

Learning Theory Private & Robust Learning Generalization & Capacity Optimization Distribution Learning

PUBLICATIONS

Alireza Fathollah Pour and Hassan Ashtiani, “Benefits of Additive Noise in Composing Classes with Bounded Capacity”
NeurIPS 2022 **Spotlight**

Full paper available at *arXiv:2206.07199*

GITHUB: https://github.com/fathollahpour/composition_noise

RESEARCH EXPERIENCE

Research Assistant

August 2022 - Present

McMaster University, Hamilton, ON - Supervised by Hassan Ashtiani

- Investigating generalization bounds of **recurrent neural networks** in noisy setting and showing that the unavoidable linear dependency of sample complexity on input length can be improved to logarithmic dependency.
- Empirically validating that adding (very) small noise does not hurt the performance and improves the generalization bound. The results are validated on a **text classification task** using BBC dataset news.
- Exploring the asymmetry of datasets to understand the performance of **transfer learning** and distribution matching.
- Investigating the mappings between datasets in generative networks with cycle consistency.

Graduate Research Assistant

January 2021 - August 2022

McMaster University, Hamilton, ON

- Investigated capacities and **generalization bounds** of neural networks and offered better designs for networks based on the magnitude/size of their parameters
- Offered a **modular design** to build complex learning algorithms out of simpler ones
- Provided a framework for studying the **capacity of random function** classes by introducing new notions of covering number with respect to distances between distributions
- Validated the results by training noisy feed forward neural networks on MNIST, computing the parameters of network, and comparing generalization bounds in practice.

Undergraduate Research Assistant

February 2018 - May 2019

Amirkabir University of Technology, Iran

- Designed optimal constellation with respect to symbol error for communication systems
- Developed by minimizing symbol error rate using deep neural networks and **autoencoders**
- Bachelor’s degree project: Classification of digital modulation with no prior knowledge
- Classification was performed using SVM and neural networks

INVITED TALKS

Spotlight paper: Benefits of Additive Noise in Composing Classes with Bounded Capacity *December 2022*
spotlight presentation and **lightning** talk
Conference on Neural Information Processing Systems, 2022

Benefits of Additive Noise in Composing Classes with Applications to Neural Networks *July 2022*
Research talk at smart Mobility for the Aging Population (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*
 - Preparing lecture notes, holding office hours and grading assignments
 - Graduate course including topics in **distribution learning**, **PAC learning**, and **differential privacy**
- **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*

CORE COMPETENCIES

Python C++ Java Pytorch Keras Tensorflow MATLAB Epsilon Modeling Framework