Mohammad Reza Ebrahimi

Dept. of Electrical and Computer Eng.
University of Toronto
Toronto, ON, Canada

mr.ebrahimi@mail.utoronto.ca
mamaj.github.io
+1-647-778-2964

Education

University of Toronto, Toronto, Canada — Sep. 2018 - Present
PhD Candidate at ECE Department
- Advisor: Ashish Khisti, PhD.

University of Tehran, Tehran, Iran — Sep. 2014 - Sep. 2017
Master of Science in Communication Systems
- **Average: 18.85/20 (4.00/4.00) - Ranked 1st**
- Thesis: *Joint channel coding and medium access control in M2M communication.* Defended (20/20)
- Advisors: Farshad Lahouti, PhD, Maryam Sabbaghian, PhD

University of Tehran, Tehran, Iran — Sep. 2010 - Sep. 2014
Bachelor of Science in Electrical Engineering - Telecommunications
- **Average: 17.94/20 (3.86/4.00) - Ranked 6/123**
- Thesis: *Indoor Positioning System Using WiFi Fingerprinting Method.*
- Advisor: Farshad Lahouti, PhD.

Research Interests

- Reliable Generative Models: Out of Distribution (OOD) Detection in Deep Generative Models
- Probabilistic Machine Learning, and Applications in High Dimensional Time Series Analysis
- Graph Signal Processing and Graph Neural Networks
- Computational Cognition and fMRI Data Analysis

Publications & Patents

[1] **M. Ebrahimi**, N. Calarco, K. Campbell, C. Hawco, A. Voineskos, and A. Khisti, "Time-Resolved fMRI Shared Response Model using Gaussian Process Factor Analysis." *arXiv preprint*, arXiv:2006.05572 (2020). *Under Review at ICASSP 2023*

[2] N Krishnan*, **M. Ebrahimi***, A. Khisti, "Sequential Gradient Coding For Straggler Mitigation." *Under Review at ICLR 2023.* **Joint first author.*

[3] **M. Ebrahimi**, F. Lahouti and V. Kostina, "Two-Layer Coded Channel Access With Collision Resolution: Design and Analysis," in *IEEE Transactions on Wireless Communications*, vol. 19, no. 12.

[4] **M. Ebrahimi**, F. Lahouti and V. Kostina, "Coded random access design for constrained outage," *2017 IEEE International Symposium on Information Theory (ISIT)*, Aachen, 2017

[5] F. Lahouti, V. Kostina, and **M. Ebrahimi**, "Coded Random Access Mechanism for Communication Networks." *U.S. Patent Application No. 16/362,567*

Programming & Software

Programming Languages:
Python (*proficient*), Matlab (*proficient*), Java (*familiar*), C/C++ (*familiar*)

Deep Learning Frameworks:
PyTorch (*proficient*), JAX/Objax, TensorFlow 2, TF Probability, TensorBoard

Scientific Computing:
NumPy, Matplotlib, SKLearn, SciPy, Pandas, Jupyter, Matlab, MatlabGUIDE,

Misc.
Android programming (Android Studio), FL Studio (music production), LaTeX

Research Experience

Centre for Addiction and Mental Health (CAMH) Jan. 2019
The Kimel Family Translational Imaging-Genetics Laboratory (TIGRlab) - Sep. 2020
– *Student Researcher*
– Adviosrs: *Dr. Aristotle Voineskos, Prof. Ashish Khisti*

"*Learning Bio-Markers of Social Cognition in Schizophrenia using fMRI (SPINS study)*"
Applying probabilistic machine learning and graph signal processing to delineate the neural pathophysiology underlying impaired social cognition in people with Schizophrenia Spectrum Disorders (SSD) with the belief that this will inform therapeutic discovery. [paper]

Center for Wireless Multimedia Communications (WMC) Sep. 2013
University of Tehran, Tehran, Iran - Sep. 2016
– *Research Assistant*
– Supervisor: *Prof. Farshad Lahouti*

My research spanned two areas: indoor localization and probabilistic random access methods using factor graphs, which led to publishing one conference paper (ISIT), one Journal paper (IEEE Transaction on Wireless Communications), and a US patent.

Work Experience

Sarveen Technologies Inc. Sep. 2016
Science and Technology Park, Tehran, Iran - 2018
Head of Indoor Positioning Team

Sarveen Technologies Inc. is a young innovative company specializing in indoor positioning, activity recognition, and IoT technologies. As the head of Indoor Positioning Team, I lead the development of core algorithms to create a robust and adaptive positioning solution used in a wide range of location-aware Sarveen products.

Teaching

CSC412: Probabilistic Learning and Reasoning, University of Toronto Winter 2021
Teacher Assistant
Instructors: Jesse Bettencourt

ECE421: Introduction to Machine Learning, University of Toronto Fall/Winter 2021,
Head Teacher Assistant - Teacher Assistant Fall/Winter 2020,
Instructors: Nicolas Papernot, Ashish Khisti, PhD Fall 2019
[programming assignment I designed on DeepDream using JAX]

ECE1504: Statistical Learning, University of Toronto Winter 2020
Teacher Assistant
Instructor: Ashish Khisti, PhD

CSC458H1F: Computer Networking Systems, University of Toronto Fall 2021, Fall 2020
Teacher Assistant Fall 2019, Fall 2018
Instructor: Sajad Shirali-Shahreza, PhD, Yashar Ganjali, PhD

Advanced Theory of Communications, University of Tehran Spring 2017
Chief Teacher Assistant
Instructor: Maryam Sabbaghian, PhD

Wireless Communication, University of Tehran Spring 2016
Chief Teacher Assistant
Instructor: Ali Azam Abbasfar, PhD

Mathematics I, University of Tehran Fall 2012
Teacher Assistant

Instructor: Mohammadreza Kolahdouz, PhD

Honors and Awards

Excellent Student M.Sc. Admission Award
B.Sc. degree, University of Tehran
Entrance examination waived as an award for being among the top-10% students
Ranked 6^{th} among 123

M.Sc. thesis nominated for the ECE school best dissertation award
University of Tehran, Tehran, Iran.

Ranked 194th among 277,814 participants
In the nationwide university entrance examination in Mathematics and Physics fields for B.Sc.

Presentation and Talks

The First Toronto Workshop on Graph Spectral Machine Learning
Invited Talk, Ryerson University, Toronto, Canada (August 2019)

2017 IEEE International Symposium on Information Theory (ISIT)
Oral Presentation, Achen, Germany (June 2017)

Selected Courses

CSC412 Probabilistic Learning: A+
STA4273 Research Topics in Statistical ML: A+
Pattern Recognition: 19/20
ECE1505H Convex Optimization: A
Stochastic Processes: 17.04/20
Advance Theory of Communications: 19.9/20
ECE1504 Statistical Learning: A+
ECE1762 Algorithms and DS: A+
Information Theory: 18.5/20
Digital Signal Processing: 18.3/20
Detection and Estimation Theory: 16.5/20
Wireless Communication: 20/20

References

Farshad Lahouti, PhD.
Electrical Engineering Department
California Institute of Technology
lahouti@caltech.edu, +1(626) 395-3474

Maryam Sabbaghian, PhD.
School of Electrical and Computer Engineering
University of Tehran
msabbaghian@ut.ac.ir