Sina Baharlouei

INTRODUCTION

Research Scientist with **5 years** of experience in **Large-scale Machine Learning** problems in academia, and **2+ years of Software Engineering** experience in industry. Solid background in **Optimization**, **Statistics**, and large-scale **data processing**, with hands on skills in various major Machine Learning libraries and Big Data frameworks.

CONTACT INFORMATION

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RESEARCH INTERESTS

- ◇ Large-scale Optimization
- ◇ Statistical Machine Learning
- ◇ Computational Biology and Bioinformatics
- ◇ Fairness and Accountability

SKILLS

- ◇ PROGRAMMING: Python, R, C/C++, Java, PHP
- ◇ MACHINE LEARNING: PyTorch, Tensorflow, Numpy, Scikit Learn
- ◇ BIG DATA: Apache Spark, MongoDB, OpenMPI
- ◇ OPTIMIZATION: CVX, Gurobi, Scipy

EDUCATION

University of Southern California (USC), Los Angeles, California
- ◇ **Ph.D in Industrial and Systems Engineering** (August 2017 - May 2023 (Expected))
  - Advisor: Prof. Meisam Razaviyayn

University of Southern California (USC), Los Angeles, California
- ◇ **Master in Statistics** (August 2019 - December 2021 (Expected))

Amirkabir University of Technology (Tehran Polytechnic), Tehran, Iran
- ◇ B.Sc. Software Engineering (September 2012 - September 2016)

WORK EXPERIENCE

- ◇ Machine Learning Research Intern, Robert Bosch LLC, Summer 2021, Pittsburgh, PA.
  - **Robust Image Recognition**: Design and implementation of state-of-the-art and the novel proposed algorithm for detection of adversarial and out-of-distribution samples in PyTorch.
  - Up to 10% Enhancement of the verified accuracy of shallow and deep convolutional neural networks by adding multiple detector/abstain classes on CIFAR10 and MNIST datasets.

HONORS AND AWARDS

- ◇ Viterbi Graduate Student Fellowship
- ◇ Bronze Medal in **International Mathematics Competition (IMC)**, Bali, Indonesia, 2011

PUBLICATIONS

- ◇ **Sina Baharlouei**, Maher Nouiehed, Ahmad Beirami, and Meisam Razaviyayn. "Rényi Fair Inference", *International Conference on Learning Representations*, 2020.
- ◇ Andrew Lowy*, Rakesh Pavan*, **Sina Baharlouei***, Meisam Razaviyayn, and Ahmad Beirami. "Fair Empirical Risk Minimization via Exponential Rényi Mutual Information", Workshop on Socially Responsible Machine Learning, ICML, 2021. (Github Link)

- ◇ Maziar Sanjabi, **Sina Baharlouei**, Meisam Razaviyayn and Jason D. Lee. "When Does Non-Orthogonal Tensor Decomposition Have No Spurious Local Minima?". *Submitted to Siam Journal on Mathematics of Data Science* (2021).
- ◇ **Sina Baharlouei**, Meisam Razaviyayn, Elizabeth Tseng, and David Tse. "I-CONVEX: Fast and Accurate de Novo Transcriptome Recovery from Long Reads". *Submitted to Nature Communications Biology* (2021). (Github Link).
- ◇ **Sina Baharlouei**, Kelechi Ogudu, Sze-chuan Suen, and Meisam Razaviyayn. "RIFLE: Robust Inference from Low Order Marginals". *Submitted to Journal of Machine Learning Research* (2021). (Github Link)

Ongoing Research

Fairness in Machine Learning

- ◇ Extending FERMI and Rényi Fair Inference to Differentially Private Learning and Clustering Problem.

Adversarial robustness via joint classification and multiple detection classes

- ◇ Training a Joint Detector/Classifier which is provably robust against adversarial attacks..

Teaching Experience

University of Southern California, Los Angeles, California

- ◇ Large Scale Optimization and Machine Learning (PhD Level), Probability Concepts in Engineering(Undergraduate Level), Engineering Statistics (Undergraduate Level)

Relevant Education and Coursework

- ◇ **Large Scale Optimization for Machine Learning**, Fall 2017: Applications of optimization algorithms in large-scale machine learning problems
- ◇ **Network Flow and Combinatorial Optimization**, Spring 2018: Analyzing classical graph problems such as Max-flow, Min-cut and raveling Salesman Problem from an optimization point of view
- ◇ **Modern Non-convex, Non-smooth Optimization**, Fall 2018: Recent methods for approximation and solving non-convex optimization problems.
- ◇ **Statistical Methodology and Machine Learning**, Spring 2018: Advanced Statistics and Linear Algebra and their applications in theoretical machine learning.
- ◇ **Deep Learning**, Fall 2019: Convolutional Neural Networks, Recurrent Neural Networks, Generative Adversarial Nets, Variationa Autoencoders.

Notable Course Projects

- ◇ Design, Implementation, and Improvement of Memory aware synapses (LifeLong Learning), (Github Link), Deep Learning, Spring 2019: Learning different classification tasks incrementally without severe accuracy loss on the previous tasks.
- ◇ Using advanced design of experiment tools for optimizing hyper-parameters of Long-Short Term Memory (LSTM) Networks, Advanced Design of Experiments, Fall 2017.
- ◇ Community Detection on Large-scale graphs via Alternating Direction Method of Multipliers (ADMM), Large Scale Optimization for Machine Learning, Fall 2017.

Talks and Presentations

- ◇ Presenting "FERMI: Fair Empirical Risk Minimization via Exponential Rényi Mutual Information" at International Conference on Machine Learning (ICML), Workshop on Socially Responsible Machine Learning, July 2021.
- ◇ Informs Session talk on fairness in machine learning: *"Rényi Fair Inference"* at INFORMS Annual Meeting 2019, Seattle, Washington.
- ◇ *"Large-scale Optimization and Big Data"*: Introducing Active Research Areas in Industrial and Systems Engineering PhD Open House, University of Southern California, March 2018.

Service

- ◇ Journal Reviews: IFAC journal Automatica, International Journal of Data Science
- ◇ Conference Reviews: IEEE ISIT 2019, AISTATS 2021, NeurIPS 2021, ICLR 2022.