Sina Baharlouei

INTRODUCTION

Research Scientist with **5 years** of experience in **Large-scale Machine Learning** in academia, and **2+ years of Machine Learning Researcher and 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

- ◇ Trustworthy AI: Fairness and Robustness in Machine Learning
- ◇ Robust Optimization, Robust Deep Learning
- ◇ Statistical Learning Theory
- ◇ Computational Biology and Bioinformatics

SKILLS

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

EDUCATION

University of Southern California (USC), Los Angeles, California

- ◇ **Ph.D in Industrial and Systems Engineering** (Fall 2017 - Summer 2023)
  - **Advisor:** Prof. Meisam Razaviyayn
  - **Thesis:** Scalable Optimization for Trustworthy AI: Robust and Fair Machine Learning
- ◇ **Master of Science in Statistics** (August 2019 - August 2022)

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 Deep Learning**: Design and implementation of Robust Neural Networks with focus on object detection of self-driving cars against adversarial samples and uncertainties.
- ◇ **Senior Backend Developer**, Turned On Digital (TOD), 2014-2016: API design and server side development and maintenance of Sibche

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* (ICLR), 2020.
- ◇ Andrew Lowy*, **Sina Baharlouei***, Rakesh Pavan , Meisam Razaviyayn, and Ahmad Beirami. "A Stochastic Framework for Fair Risk Minimization", Transaction on Machine Learning Research (TMLR), 2022. (Github Link)

- Andrew Lowy*, **Sina Baharlouei***, Rakesh Pavan , 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*.
- **Sina Baharlouei**, Fatemeh Sheikholeslami, Meisam Razaviyayn, and Zico Kolter: Improving adversarial robustness via joint classification and multiple explicit detection classes. ICML Workshop on Formal Verification of Machine Learning (2022).
- **Sina Baharlouei**, Meisam Razaviyayn, Elizabeth Tseng, and David Tse. "I-CONVEX: Fast and Accurate de Novo Transcriptome Recovery from Long Reads". Data Science for Life Sciences Workshop ECML-PKDD (2022). (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* (JMLR). (Github Link)

Ongoing Research

Fairness in Machine Learning

- Robust Fair Inference in the Presence of Distribution Shifts and Missing Values.
- Fair Unsupervised Learning.

Distributionally Robust Learning

- Robust Inference in the Presence of Missing Values
- Inference in the Presence of Batch Effect

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: Studying classical graph problems such as Max-flow, Min-cut, and TSP 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, Variational Autoencoders.

Notable Course Projects

- Design, Implementation, and Improvement of Memory aware synapses (**LifeLong Learning**), (Github Link), Deep Learning, Spring 2019.
- 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.

◇ Implementing a lexer and a parser in OCaml, Fall 2015.

◇ Discovering significant biological patterns in DNA sequences of Human, Bacteria, and Mammals using Pattern Matching algorithms such as Boyer-Moore and Z-algorithm, **Computational Biology**, Spring 2019.

TALKS AND PRESENTATIONS

◇ **Talk**, *"Rényi Fair Inference"* at INFORMS Annual Meeting 2019, Seattle, Washington.

◇ **Talk**, *A Stochastic Framework for Fair Risk Minimization"* at INFORMS Annual Meeting 2012, Indianapolis, Indiana.

◇ **Lightening Talk**, *"Large-scale Optimization and Big Data"*: Introducing Active Research Areas in Industrial and Systems Engineering PhD Open House, USC, March 2018.

• **Talk**, *"Fair and Robust Machine Learning Through Min-Max Optimization"* at **Google Research**, Sep 2022.

PAPER REVIEWS

◇ JOURNAL: IFAC journal Automatica, International Journal of Data Science,

◇ CONFERENCE: ISIT 2019, AISTATS 2021, NeurIPS 2021, ICLR 2022, NeurIPS 2022.

◇ WORKSHOP: Trustworthy and Socially Responsible Machine Learning, NeurIPS 2022

PROFESSIONAL MEMBERSHIPS

◇ Member of Optimization Society and Operations Research at INFORMS

◇ Editorial Board Member of International Journal of Data Science (IJDS)