Sara Babakniya

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RESEARCH INTERESTS

Federated Learning, Privacy and Fairness in Machine Learning, Neural Network Architecture Search, Natural Language Processing, Meta Learning

EDUCATION

University of Southern California — CA, USA
Doctor of Philosophy, Computer Science — Aug 2019 – Present
- Advisor: Prof. Leana Golubchik
- GPA: 3.92/4

Sharif University of Technology — Tehran, Iran
Bachelor of Science, Electrical Engineering — Aug 2014 – May 2019

EXPERIENCE

Quantitative Evaluation & Design Laboratory — Aug 2019 – Present
Graduate Research Assistant — University of Southern California
- **Communication-Efficient Federated Learning (ongoing)**
  - Propose a model compression algorithm to reduce the communication cost in Federated Learning.
- **Neural Network Architecture Search**
  - Propose more general methods to do Neural Network Architecture Search for various tasks and datasets including but not limited to image classification and NLP.
  - Develop performance predictor of Neural Networks on different devices (accuracy/inference latency)
- **Backdoor Attack in Federated Meta-Learning**
  - Explore different backdoor attack scenarios in federated meta-learning and possible defense mechanisms to improve effectiveness and performance.

Cloud-native Telecommunication Networks Laboratory — Sep 2017 – May 2019
Undergraduate Research Assistant — Sharif University of Technology
- Developed and designed E2E Cloud-based 5G Network Platform
- Implemented an E2E Software-Defined Networks for Cloud Communication
- Built an SDN-based backward compatible platform to emulate data centers inter-connection networks

Optical Networks Research Laboratory — Jul 2018 – Jul 2019
Undergraduate Research Assistant — Sharif University of Technology
- Implemented an E2E Software-Defined Optical Network platform (SDON or TSDN)

PUBLICATIONS

1. Sourya Dey, **Sara Babakniya**, Saikrishna C. Kanala, Marco Paolieri, Leana Golubchik, Peter A. Beerel, and Keith M. Chugg. "Deep-n-cheap: An Automated Search Framework for Low Complexity Deep Learning". Springer Nature Computer Science, 2021

2. Chien-Lun Chen, **Sara Babakniya**, Marco Paolieri, and Leana Golubchik. "Defending Against Poisoning Backdoor Attacks on Federated Meta-Learning". Submitted to ACM Transactions on Intelligent Systems and Technology, 2021

SKILLS

Languages: Python, Java, C, C++, SQL, MATLAB
Machine Learning: ML Models and Algorithms, Language Models, Transformers, Model Compression, Quantization
Machine Learning libraries: Pytorch, Tensorflow, Torchtext, Keras, Pandas, scikit-learn, seaborn, Huggingface, NLTK
Software engineering fundamentals: Data structure, Algorithm design, Object Oriented Programming

PROFESSIONAL SERVICE

Reviewer Elsevier Journal, Performance Evaluation   Jul 2020

HONORS, AWARDS & CERTIFICATES

GHC Scholarship from AnitaB	2021
Ranked top 27th (less than 0.1%) in Nation-wide University Entrance Exam, Iran	2014
Iran's National Elites Foundation Fellowship	2014 – 2019
Admitted to National Organization for Development of Exceptional Talents (NODET)	2007 – 2014
ICT Professional Foundation Program Certification, Ericsson, Iran	2017

TEACHING & MENTORING

- **Teaching Assistant**
  - Teaching Assistant, Data Networks, Sharif University of Technology   Fall 2018
  - Teaching Assistant, Introduction to Machine Learning, Sharif University of Technology   Fall 2018
  - Laboratory Assistant, EE principles Laboratory, Sharif University of Technology   Fall 2016
- **Mentoring**
  - Meiyu Zhong (Master), Neural Network Architecture Search, USC   May 2020 – Mar 2021

SELECTED COURSEWORK

- **During Ph.D.**: Privacy in the World of Big Data, Deep Learning for Engineering, Applied Natural Language Processing, Advanced Analysis of Algorithms

- **During B.Sc.**: Data Networks (Grad level), Mobile & Wireless Communications (Grad level), Network Coding & Information Theory (Grad level), Theoretical Machine Learning (Grad level), Machine Learning (Grad level), Database Design, Theory of Language & Automata, Digital Communications, Communication Systems

SELECTED ACADEMIC PROJECT

- **Implementation of BBR on a compact version of TCP (cTCP) to increase throughput**
  CS651: Advanced Computer Networking, University of Southern California
- **Spoken Language Classification with DNNs in Tensorflow**
  EE599: Deep Learning for Engineers, University of Southern California
- **Set up a category classifier and fashion compatibility classifier on the "Polyvore" dataset**
  EE599: Deep Learning for Engineers, University of Southern California
- **Survey on Private Information Retrieval (PIR)**
  Network Coding & Information Theory, Sharif University of Technology
- **Survey on Graphical Models**
  Theoretical Machine Learning, Sharif University of Technology
- **Site survey and Wifi signal Propagation Modeling**
  Mobile Communications, Sharif University of Technology
  Sampling power Wifi Signal to derive a more accurate model of indoor wireless signal propagation and attenuation.

EXTRACURRICULAR ACTIVITIES

- 2nd Conference on Modern Wireless Telecommunication Systems(5G), Student Committee   2017
- Core member of IEEE,Sharif student branch   2016
- Main member of "RESANA" Cultural and Scientific club of EE Dept.   2015 – 2016

REFERENCES

Leana Golubchik
Stephen and Etta Varra Professor
Professor, CS & ECE
University of Southern California
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Keith Chugg
Professor and Associate Chair
Professor, ECE
University of Southern California
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