Farshid Varno

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Intro

I am a Machine Learning Research Scientist and Engineer with a strong technical background and a thirst for building new technologies. I'm a Team player who strives to communicate, share, and achieve as a group. In summary I am the:

- Creator of FedSim Simulator
- ML Research Scientist at Institute for Big Data Analytics
- Doctoral Candidate at Dalhousie University

Experience

Research & Industry

Research Scientist, Institute for Big Data Analytics
March 2022 - present, Halifax, Canada

Leading a team of four researchers from Dalhousie University and Concordia University to conduct research on the following projects:

- Jeebs Effect, Preserving Privacy in Multi-Task Federated Learning.
- Closing the Gap Between Federated and Centralized Learning.
- Fedra for better aggregation in Federated Learning (to maintain confidentiality, the title is slightly modified.)
- On the Role of Dynamic Learning Rate Scheduling in LocalSGD.

Research Scientist, Imagia
May 2018–March 2022, Montreal, Canada

- Member of Open Innovation team.
- Research on *Federated Learning* optimization led to SoTA performance via drift elimination.
- Research on Transfer Learning led to a filed patent.
- Research on multiple Meta Learning and Few-shot Learning projects.
- Research on Multi-hypothesis Transfer Learning and out of distribution generalization.
- Collaborated with R&D team in designing an AI library for Imagia research.
- Collaborated with IT in porting Polyaxon on a cluster of NVIDIA DGX systems.

Research Assistant, Institute for Big Data Analytics
May 2017–May 2018, Halifax, Canada

- Research on predicting human behaviour from *fMRI* data.
- Developing a *CNN* framework for detecting corrosion in aircrafts using *D-Sight* technology (*DAIS*).
- Optimizing calculation of minimum distance to shore from *AIS-GIS* streaming data using *CUDA* and *OpenMP*.

- Research on sparsity, activation functions and normalization.

Data Scientist (part-time), Cognitive Health and Recovery Research Lab
Mar 2020–Jun 2020, Halifax, Canada

- Clinical data integration and visualization.
- Investigating post-operative cognitive dysfunction in elderly patients.
- Analyzing surgical time series data (anesthesia depth, patients' vitals, ...).

FPGA Engineer, Kara Telephone
Jun 2013–Jun 2014, Tehran, Iran

- Design & Imp. of TDM switches on FPGAs supporting up to 16k x 16k channels (in VHDL)
- Multi-channel I2C master controller supporting 16 modules with error checking & correction.
- SPI & USART Peripheral interfaces.
- Embedded Processors, RTOS
- Focus on speed optimization on Altera Cyclone series

RTL Designer, SarvNet Tele. Inc.
May 2012–Sep 2012, Isfahan, Iran

- Design & Imp. of lightweight AES modules used in STM4 lines
- Multi-channel I2C master controller supporting 16 modules with error checking & correction.
- SPI & USART Peripheral interfaces.
- Focus on area optimization on Xilinx Virtex 4, 6 series

Teaching

- Co-instructor, ML for Big Data, CSCI-6515, Dalhousie University, Fall 2020
- Teacher Assistant, ML for Big Data, CSCI-6515, Dalhousie University, Fall 2018
- Teacher Assistant, Digital Circuits, ECED-2200, Dalhousie University, Winter 2016
- Teacher Assistant, System Analysis, ECED-3401, Dalhousie University, Fall 2017
- Instructor, Computer Architecture, Chehelsotoon Inst. for Higher Edu, Fall 2015
- Instructor, System Programming, Chehelsotoon Inst. for Higher Edu, Fall 2015
- Teacher Assistant, Java Programming, University of Guilan, Winter 2009
- Teacher Assistant, Algorithms, University of Guilan, Winter 2010

Background

Education

- Ph.D., Computer Science. Dalhousie University. 2017–present, CGPA: 4.19
- M.Sc., Computer Architecture. University of Isfahan. 2012–2015, CGPA: 4.02
- B.Sc., Guilan University. 2008–2012.

Skills

- Programming languages: **Python**, Java, C/C++, Bash
- Deep learning frameworks: **PyTorch**, Keras, Tensorflow

- CI/CD platform: **Github Actions**
- MLOps, automation & AI scaling systems: **Polyaxon**, **MLflow**
- Machine learning libraries: Pandas, Scikit-learn, Numpy, Scipy
- Markup languages: LaTeX, Markdown, RestructuredText, Mermaid
- Project Management tools: Jira, YouTrack

Publications

Papers

- Varno, Farshid, Marzie Saghayi, Laya Rafiee, Sharut Gupta, Stan Matwin, and Mohammad Havaei. "Minimizing Client Drift in Federated Learning via Adaptive Bias Estimation." *European Conference on Computer Vision.* – **ECCV** (2022).
- Varno, Farshid, Lucas May Petry, Lisa Di Jorio, and Stan Matwin. "Learn Faster and Forget Slower via Fast and Stable Task Adaptation." *arXiv preprint arXiv:2007.01388* (2020).
- Varno, Farshid, Behrouz Haji Soleimani, Marzie Saghayi, Lisa Di Jorio, and Stan Matwin. "Efficient neural task adaptation by maximum entropy initialization." *arXiv preprint arXiv:1905.10698* (2019).
- Jiang, Xiang, Mohammad Havaei, Farshid Varno, Gabriel Chartrand, Nicolas Chapados, and Stan Matwin. "Learning to learn with conditional class dependencies." In *international conference on learning representations.* – **ICLR** (2018).
- Saghayi, Marzie, Jonathan Greenberg, Christopher O'Grady, Farshid Varno, Muhammad Ali Hashmi, Bethany Bracken, Stan Matwin, Sara W. Lazar, and Javeria Ali Hashmi. "Brain network topology predicts participant adherence to mental training programs." ***Network Neuroscience*** 4, no. 3 (2020): 528-555.

Patent

- Varno, Farsheed, Behrouz Haji Soleimani, Marzie Saghayi, Lisa Di Jorio, and Stan Matwin. Method and system for initializing a neural network. https://patents.google.com/patent/WO2020225772A1. _ EP WO CA CN_ (2020)

Honors

Leadership & Volunter Work

- Vice-president of Public Relations, Toastmasters International, Dal Toastmasters, 2020.
- Experienced leading teams of 2-3 researchers during several projects.
- Mentored two masters students, now working as Senior Data Scientists in USA & Brazil.
- Reviewer at Computer Vision and Pattern Recognition (**CVPR 2023**, 5 papers).
- Reviewer at European Conference on Computer Vision (**ECCV 2022**, 2 papers).
- Conference Program Committee Member & Volunteer
  - International Conference on Learning Representations (ICLR 2020)
  - SIGKDD Conference on Knowledge Discovery and Data Mining (KDD 2017).

Awards & Recognition

- Accelerate Award, 56k CAD, Mitacs, 2021-2022
- Scotia Scholar Award, 45k CAD, Research Nova Scotia, 2019-2021
- Best Graduate Student Research Award, Big Data Congress, Sep 2017
- Nova Scotia University Student Bursary, Government of Nova Scotia, 2020-2022

- FGS's alloc. for outstanding status, 2k CAD, Dalhousie University, Aug 2017
- First Rank Student Recognition, University of Isfahan, Mar 2015