Sara Zendehboodi

PhD, Machine Learning

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HIGHLIGHTS OF QUALIFICATION

- Research focus on Machine Learning application in communication systems (quantization).
- Experience in Machine Learning, Natural Language Processing, Deep Learning, Image Processing, & Generative AI.
- Extensive teaching experience in computer programming, Machine Learning, NLP and Data Structures.

EXPERIENCE

Mohawk College, Hamilton, ON

Professor of Artificial Intelligence Feb. 2024 – Present

- Teaching includes Programming (Python and Java), Software quality and testing, Machine Learning, Deep Learning, Natural Language Processing, System design and analysis.
- Developing outlines for courses including object-oriented programming, Machine Learning, and Deep Learning.
- Contributing and Leading students in Applied ML Research projects in collaboration with industry partners.

Professor, part-time Sept. 2022 – Jan. 2024

- Lead classes of 50+ students in software/network engineering and graduate certificate program.
- Rated above college average within 2 semesters of teaching.

Data Scientist Intern

SOTI Inc., Mississauga, ON Sept. 2023– Dec. 2023

- Researched on image captioning using multimodal large language models and designed a custom pipeline.
- Troubleshoot and improved on existing code to add a new feature to the next release of SOTI SNAP.
- Finetuned object detection models to be used along with LLMs for automated app generation.
- Boosted the inference time of the selected object detection model by 10X, making it excellent for multi-threading.

Research and Teaching Assistant

McMaster University, Hamilton, ON Sept. 2019 – Dec. 2024

- Generated, analyzed, interpreted, and engineered data needed for research.
- Created data-driven optimization algorithms for the optimal design of distributed scalar quantizers for classification applications (Python and MATLAB).
- Decreased the misclassification error by 50% compared to the best existing method in the studied scenario.
- Developed profound mathematical proofs for the optimality of the design.
- **Assisted in teaching** *Object Oriented Programming (4x), Fundamentals of Machine Learning (3x), Deep Learning (2x), Data Structures and Algorithms (7x), Web and Mobile Applications (3x), Algorithm Design and Analysis, Visual Effects and Technology for Animated Production, Computer Security (2x), Principles of Programming.*

Research and Teaching Assistant

Shiraz University, Shiraz, Iran Sept. 2016 – June 2019

- Applied Machine Learning and image processing in designing dictionaries to fusion out-of-focus images.
- Improved the base model's performance by 12% using morphological operations for decision map refinement.
- **Assisted in teaching** *Image Processing, Signal Processing*

EDUCATION

PhD in Electrical and Computer Engineering (Grade: A+)

McMaster University, Hamilton, ON Sept. 2019 – Sept. 2024

- **Courses completed:** Information Theory and Coding, Data Science, Network Information Theory, Fundamentals of Unsupervised Learning (Audit), Special Topics in Computation (Machine Learning, Audit)

Master of Science in Electrical Engineering (Grade: A, Second Class Honors)

Shiraz University, Shiraz, Iran Sept. 2016 – June 2019

- **Courses completed:** Machine Learning, Image Processing, Pattern Recognition, Convex Optimization, Discrete-Time Signal Processing, Random Processes

Bachelor of Science in Electrical Engineering (Grade: A, Second Class Honors)

Shiraz University, Shiraz, Iran Sept. 2012 – June 2016

- Was awarded direct acceptance to the master program (without the national entrance exam)

SKILLS

- **Programming and Tools:** Python, Java, MATLAB, SQL, C++, R, Tableau, Unreal Engine 5, Scikit-learn, TensorFlow, PyTorch, Azure
- **Version Control:** Git
- **OS:** Windows, Mac
- **Technical:** Machine Learning, Wireless Communication, Data Science, Signal and Image Processing, Natural Language Processing, Statistical Analysis, Feature Engineering, Algorithms, Deep Learning, Mathematics

SELECTED PROJECTS

Kaggle Competitions

Optiver Realized Volatility Prediction (Tabular Data)

- Ranked top 5% among 4000 teams (Silver medal, as a team) in a competition for predicting stock market volatility.
- Performed feature engineering with limited prior knowledge, statistical analysis, and visualization on data.
- Implemented single models of TabNet, light GBM, FFNN, DNN and XGBoost, and as the final solution applied weighted average of TabNet, Light GBM and FFNN.
- Tools: Python, Pytorch, Tensorflow, Keras, pandas, seaborn, plotly , NumPy

Covid-19 Detection (Computer Vision)

- Achieved top 18 % ranking (as a team) in a competition for detecting and localizing Covid-19 abnormalities on chest radiography dicom files.
- Performed an ensemble of Yolov5, EfficientNet, RCNN.
- Tools: Python, Pytorch, Tensorflow, Keras, Pydicom, OpenCV, wandb, NumPy

PUBLICATIONS

- "**Optimal Distributed Quantizer Design for Binary Classification of Conditionally Independent Vector Sources**" S Zendehboodi, S Dumitrescu, 2024 IEEE International Symposium on Information Theory (ISIT).
- "**Globally Optimal Design of a Distributed Scalar Quantizer for Linear Classification**" S Dumitrescu, S Zendehboodi, 2021 IEEE International Symposium on Information Theory (ISIT), 3167-3172.
- "**On the Design of Globally Optimal Distributed Scalar Quantizer for Linear Classification**" S Zendehboodi, S Dumitrescu, Submitted to IEEE Transactions of Information Theory (Under Review).
- "**A Dictionary Based Method of Multi-Focus Image Fusion Using a New Decision Map**" S Zendehboodi, M Yazdi, Submitted to Iranian Journal of Science and Technology Transactions of Electrical Engineering (Under Revision).

VOLUNTEERING AND AWARDS

Committee member for selecting ECE department chair at McMaster University. Winter 2022

Researched on different candidates' backgrounds. Participated in discussions about candidates' qualifications. Took part in interviewing each candidate. Asked for opinions on each candidate from different members of graduate community at ECE. Voted as one of the 10 committee members.

Interviewee for the department accreditation by the Canadian Engineering Accreditation Board. Winter 2022

Answered questions about the processes and teaching and learning schemes as a TA. Provided examples of different experiences and challenges faced by TAs and the way these challenges are addressed at ECE.

3MT seminar winner Fall 2021

Presented a live 3-minute seminar about my research to a general audience. Was honored to be among the commendation winners from the judges.
https://youtu.be/2WObordJBn8

CERTIFICATES AND COURSES

- Microsoft Certified: Azure AI Fundamentals.
- Machine Learning by Stanford University. *Coursera*
- Transformers: Text Classification for NLP Using BERT*, LinkedIn Learning.*
- Unreal Engine 5 C++ Developer. *Udemy*
- Leadership: Practical Skills. *LinkedIn Learning.*