Ahmad Sajedi

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Highlights of Qualifications

- 6 years of industry and academic experience as a Machine Learning Researcher/Engineer, specializing in Computer Vision and Efficient AI
- Authored and led over 6 papers published at top-tier ML conferences, including CVPR, ECCV, ICCV, NeurIPS, and ICASSP
- Having Ph.D. and M.Sc. in Machine Learning from Electrical and Computer Engineering stream
- Experience with coding on ML platforms such as PyTorch, TensorFlow, etc.
- Strong communication, collaboration, and problem-solving skills

Professional Experience

Machine Learning Researcher
Toronto, CA

Royal Bank of Canada (RBC)
Jan 2022 - Present

- Built two efficient learning pipelines with custom feature loss, achieving 5x cost reduction and 9% accuracy improvement (ICCV '23, CVPR '24)
- Generated 15 small-scale synthetic datasets (0.02% of original size) using generative models for vision and medical applications, significantly reducing training costs for CNN and ViT models (ECCV '24)
- Innovated a dataset condensation algorithm utilizing pre-trained variational auto-encoders for tabular datasets, achieving up to 25x faster training with PyTorch (NeurIPS '24)
- Led 4 machine learning projects, resulting in the successful publication of three projects in top-tier ML and computer vision conferences
- Filed invention disclosures for three U.S. patents related to efficient AI and generative models

Graduate Research Associate
Toronto, CA

University of Toronto
Sep 2020 - Jul 2024

- Investigated the impact of data on knowledge distillation to improve image classification, achieving up to 20x acceleration in training and inference using PyTorch and TensorFlow (5 papers at ICCV '23, CVPR '24, ECCV '24, NeurIPS '24)
- Developed sota multi-label contrastive learning framework with probabilistic representations for COCO and clinical datasets (ICASSP '24)
- Introduced a novel probabilistic distance metric tailored for machine learning applications (ICASSP '23)
- Led over 8 machine learning projects, resulting in 6 publications at top conferences, and provided supervision to graduate students

Graduate Research Assistant
Waterloo, CA

University of Waterloo
Sept 2018 - Aug 2020

- Improved computational costs in training CNN models using sparsity and feature map patterns in Python and C++
- Collaborated with other engineers/researchers to refine data pipelines and model infrastructure, packaging them as libraries on GitHub.

Education

University of Toronto
Toronto, CA

Ph.D. in Electrical and Computer Engineering, GPA: 3.86/4
Sep 2020 - Jul 2024

- **Thesis:** "On the Effect of Data on Image Classification Tasks," focusing on Efficient AI and Generative Models, Thesis Award Candidacy
- **Relevant Courses:** Machine Learning, Data Science and Analytics, Digital Image Processing, Statistical Learning, Convex Optimization

University of Waterloo
Waterloo, CA

M.Sc. in Electrical and Computer Engineering, GPA: 4/4
Sep 2018 - Aug 2020

- **Thesis:** "Coding for Data Analytics: New Information Distances," focusing on statistical metric in AI and signal processing

Amirkabir University of Technology
Tehran, IR

B.Sc. in Electrical and Computer Engineering, GPA: 3.94/4
Sep 2014 - Aug 2018

Skills

Programming	Python (Pandas, PyTorch, TensorFlow, NumPy, Scikit-learn. etc.), R (ggplot2), MATLAB, HTML.
Technologies	Deep Learning, Computer Vision, Natural Language Processing, Linux, LaTeX, Microsoft Office, Git.
Soft Skills	Time Management, Teamwork, Problem-solving, Documentation, Engaging Presentation.

Projects and Publications

First Author Machine Learning Projects (1 ECCV, 1 ICCV, 1 CVPR, 2 NeurIPS, 2 ICASSP, 1 ACM)

[P1] "Data-to-Model Distillation: Data-Efficient Learning Framework", Sajedi et al., **ECCV '24**
Fine-tuned generative models for efficient training | Saved learnable parameter storage up to 35x | Accelerated model training

[P2] "DataDAM: Efficient Dataset Distillation with Attention Matching", Sajedi et al., **ICCV '23**   [Paper] [Webpage]
Implemented an efficient data-centric algorithm with PyTorch | Improved accuracy by 7% | Applied in neural architecture search and continual learning

[P3] "ATOM: Attention Mixer for Efficient Dataset Distillation", Sajedi et al., **CVPR '24**   [Paper] [Webpage]
Biult an efficient dataset condensation pipeline with PyTorch for Green AI | Achieved 3x reduction in GPU memory storage

[P4] "ProbMCL: Probabilistic Contrastive Learning for Multi-label Visual Classification", Sajedi et al., **ICASSP '24**   [Paper] [Webpage]
Improved multi-label classification performance using probabilistic representations by 2% | Accelerated downstream training time by 2x

[P5] "A New Probabilistic Distance Metric with Application in Gaussian Mixture Reduction", Sajedi et al., **ICASSP '23**   [Paper]
Proposed a statistical metric with application in AI and signal processing | Achieved 100x acceleration in runtime for Gaussian mixture reduction algorithms

[P6] "Subclass Knowledge Distillation with Known Subclass Labels", Sajedi et al., **IVMSP '22**   [Paper]
Developed a model compression technique using privileged information with TensorFlow | Improved accuracy by 2% F1-score for medical dataset

[P7] "Multi-label Dataset Distillation with Matching Set Construction", Sajedi et al., **NeurIPS '24** pending
Achieved first lossless dataset distillation for medical and remote sensing datasets | Improved 5% F1 score accuracy | Reduced total storage by 2x

[P8] "Exploring the Effects of Data Condensation on Tabular Datasets", Sajedi et al., **NeurIPS '24** pending
Implemented the first dataset distillation pipeline for financial datasets | Achieved 25x acceleration in model training | Realized 10x cost savings on data storag

[P9] "Supervised Contrastive Learning for Multi-label Visual Representation", Sajedi et al., **Pattern Recognition** pending   [Paper]
Created an end-to-end training pipeline for multi-label classification using contrastive kernel representations | Reduced computational complexity by 35%

[P10] "FedPnP: Personalized Graph-Structured Federated Learning", **Pattern Recognition** pending
Developed a graph-based distributed learning framework using PyTorch | Theoretically analyzed the convergence rate of the proposed algorithm

[P11] "High-Performance Convolution using Sparsity and Patterns for Inference in Deep CNNs", **ACM** pending   [Paper]
Proposed two novel convolution algorithms for model compression | Reduced memory footprint by 10x | Accelerated inference time by up to 9%

Patents

[P1] Efficient Dataset Distillation with Attention Matching, **U.S. Patent**
   Ahmad Sajedi, Ehsan Amjadian, Samir Khaki, Lucy Z. Liu, Yuri A. Lawryshyn, Konstantinos N. Plataniotis

[P2] Data-to-Model Distillation, **U.S. Patent**
   Ahmad Sajedi, Ehsan Amjadian, Samir Khaki, Lucy Z. Liu, Yuri A. Lawryshyn, Konstantinos N. Plataniotis

[P3] Tabular Dataset Condensation, **U.S. Patent** pending
   Samir Khaki, **Ahmad Sajedi**, Kai Wang, Lucy Z. Liu, Yuri A. Lawryshyn, Konstantinos N. Plataniotis

Honors and Teaching Experiences

Primary Chair	Chair of the first dataset distillation challenge workshop at ECCV '24	2024
Reviewer	Reviewed papers for top-tier conferences such as NeurIPS '24, ECCV '24, and ICASSP '24	2024
Invited Talk	Gave a talk at the Royal Bank of Canada on Efficient AI in Financial Classification Tasks	2023, 2024
Invited Talk	Gave a talk at the Royal Bank of Canada on Model Compression Techniques	2022
Project TA	Digital Image Processing and Applications, University of Toronto	2023, 2022
Project TA	Data Science Methods and Statistical Learning, University of Toronto	2024, 2023, 2022
Project TA	Introduction to Data Science and Analytics, University of Toronto	2021
Project TA	Introduction to Machine Learning and Data Mining, University of Toronto	2021
Assistant	Convex Optimization, University of Waterloo	2020
Assistant	Probability and Applications, University of Toronto	2020-2024
Assistant	Probability, Statistics, and Data Analysis I, University of Toronto	2023, 2021