Soroush Ziaeinejad

Machine Learning Researcher | PhD in Computer Science | Toronto, Ontario, Canada

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SUMMARY

Machine learning researcher and engineer. Completed a PhD in Computer Science in September 2026 with a thesis on client selection in federated learning. Experienced in information retrieval, ranking and recommendation, natural language processing, and computer vision. Published in Information Fusion (Elsevier) and ACM CIKM, with papers in press at ICMHI and FLLM. Formerly served as a machine learning engineer at Chamrosh Tech and built a computer vision platform for authenticating handwoven Persian rugs. MSc in Computer Science, focused on computer vision, with a thesis on event detection in urban surveillance videos. BSc in Computer Engineering, with a thesis integrating static and dynamic program analysis for predicting Java code faults.

TECHNICAL SKILLS AND TOOLS

Core ML: federated learning · graph neural networks

Programming & ML: Python (primary) · PyTorch · Flower (federated learning) · PyTorch Geometric (GNNs) · scikit-learn

Information Retrieval: recommender systems · ranking evaluation metrics · document and user embedding

NLP & LLM tools: Hugging Face Transformers · LLM training and fine-tuning · topic modeling · NLTK

DevOps & Databases: Git · Weights & Biases (W&B) · Docker · AWS · SQL

Data Science: Pandas · NumPy · Matplotlib

EXPERIENCE

Research Assistant (PhD) - University of Windsor Sep 2021 - Sep 2026

- Developed a context-aware client-selection strategy for federated learning under non-IID data distributions.
  - Applied the strategy to federated medical image classification with ResNet-50 on 5 datasets. Built the experimental pipeline in Python using PyTorch and Flower. Improved convergence speed, precision, and AUC. In press, ICMHI, 2026.
  - Adapted the strategy for instruction fine-tuning with PEFT/LoRA. Built the experimental pipeline in Python using PyTorch, Hugging Face, and Flower. Improved topic-level convergence and performance on rare topics. In press, FLLM, 2026.
  - First-authored a survey on federated learning. Introduced a taxonomy of existing methods and proposed context-aware client-selection strategies to address data heterogeneity. Published in Information Fusion (Elsevier), 2026.
- Developed and released SEERa, an end-to-end open-source Python framework for predicting like-minded user communities in text-based social networks from users' evolving interests. Published at CIKM, 2022. SEERa on GitHub.
  - Designed SEERa as a five-layer framework for community prediction on Twitter data, including data cleaning and feature extraction, topic modeling, user representation, temporal user graph embedding, and graph clustering layers.
  - Evaluated SEERa as a news article recommender system using the ranking metrics NDCG, MRR, and F1@k.

Machine Learning Engineer - Chamrosh Tech 2019 - 2021

- Joined as the first ML engineer and built the foundational AI system for a Persian rug authentication platform, supporting fraud prevention and copyright protection. Patent pending.
- Designed and implemented an end-to-end computer vision pipeline to generate unique digital signatures from rug scans. Trained an image-to-image translation model to reconstruct rug design maps, generate signatures, and match rugs against registered records.
- Addressed the domain shift between professional scans used for training and camera photographs received in production. Trained and integrated an encoder to map photographs into scan-like representations for the authentication pipeline.
- Worked across the full ML development lifecycle, including data collection and cleaning, model architecture, training, and testing.

Research Assistant (MSc) - Amirkabir University of Technology 2016 - 2019

- Investigated the detection and classification of rare, safety-critical events in urban surveillance videos, including fires, car crashes, street fights, and robberies. Explored sparse representation and deep CNNs for event recognition.
- Applied GAN-based anomaly detection and transfer learning to surveillance computer vision tasks with limited labeled data.
- Built a crowd-counting system for dense scenes and integrated crowd-derived features into the event-recognition pipeline.

EDUCATION

PhD, Computer Science - University of Windsor, Windsor, ON, Canada — Sep 2021 - Sep 2026
Advisor: Dr. Saeed Samet
Dissertation: *Context-Aware Client Selection in Centralized Federated Learning*

MSc, Computer Science - Amirkabir University of Technology (AUT), Tehran, Iran — 2016 - 2019
Advisor: Dr. Mohammad Rahmati
Thesis: *Multiple Event Detection in Surveillance Videos Using Sparse Representation*

BSc, Computer Engineering - Iran University of Science and Technology (IUST), Tehran, Iran — 2012 - 2016
Advisor: Dr. Saeed Parsa
Thesis: *Integration of Static and Dynamic Analyses of Java Code Faults*

PUBLICATIONS

- **S. Ziaeinejad** and S. Samet. "Federated Learning with Context-Aware Client Collaboration: Challenges, Advances, and Open Problems." Information Fusion, Elsevier, 2026. [paper]
- **S. Ziaeinejad** and S. Samet. "Context-Aware Client Selection in Federated LLMs under Non-IID Distributions." FLLM, 2026 (In press).
- **S. Ziaeinejad** and S. Samet. "Context-Aware Client Selection in Federated Learning for Heterogeneous Medical Imaging." ICMHI, 2026 (In press).
- **S. Ziaeinejad**, S. Samet, and H. Fani. "SEERa: A Framework for Community Prediction." ACM CIKM, 2022. [paper]
- A. Atghaei, **S. Ziaeinejad**, and M. Rahmati. "Abnormal Event Detection in Urban Surveillance Videos Using GAN and Transfer Learning." Smart Tehran Conference, 2019. [paper]

TECHNICAL COMMUNICATION, MENTORING, AND TEACHING

Mentor - Agentic AI Challenge, JLR Hackathon (University of Windsor × Jaguar Land Rover) — 2024 - 2025
- Mentored student teams on AI system architecture, LLM integration, and agentic reasoning frameworks in collaboration with Jaguar Land Rover engineers.

Research Project Mentor - University of Windsor — Jan 2023 - May 2025
- Delivered recurring workshops teaching graduate and undergraduate students to apply methods hands-on: machine learning and neural networks with PyTorch, graph neural networks with PyTorch Geometric, NLP, topic modeling, recommender systems, and social-network analysis.

Graduate Teaching Assistant - University of Windsor — 2021 - 2026 · 15 semesters
- Internet Applications and Distributed Systems; Deep Learning and Neural Networks; Advanced Systems Programming; Systems Programming; Compilers; Database Management Systems; Information Security for IT; Algorithms and Programming.

Graduate Teaching Assistant - Amirkabir University of Technology — 2016 - 2019
- Digital Image Processing; Pattern Recognition; Computer Vision.

Volunteer Teaching Assistant - Iran University of Science and Technology — 2012 - 2016
- Data Structures and Algorithms; Advanced Programming; Languages Theory and Automata; Database Design.

SELECTED ACADEMIC HONORS

Demo Day Winner, Best Research Project for SEERa, University of Windsor (2023) | Ranked 9th, top 1%, National PhD Entrance Exam, Iran (2019) | Ranked 5th of 60+ teams, Data Mining Contest, AUT × Alibaba (2019) | Ranked 71st, top 0.25%, National MSc Entrance Exam, Iran (2016) | Ranked 1st of 25 teams, ACM Programming Contest, IUST (2014)

ACADEMIC SERVICE

- Mentor, leading a student team on the course topic "Project Management: Techniques and Tools," University of Windsor.
- Organizer, Smart Tehran Conference, Tehran Municipality ICT Organization (2019).
- Organizer, ACM Programming Contest, School of Computer Engineering, IUST (2015).