Parvin Malekzadeh

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EDUCATION

Ph.D. in Electrical and Computer Engineering, University of Toronto, Canada *(Sep. 2020- Aug. 2024)*
GPA: 3.8/4
Thesis: *Advancing Efficiency and Safety in Autonomous Sequential Decision-Making Agents*
Advisor: Prof. Konstantinos N. Plataniotis

M.Sc. in Electrical and Computer Engineering, Concordia University, Canada *(2018- 2020)*
GPA: 4.1/4.3
Thesis: *Bayesian Estimation for Localization and Decision Support of Autonomous Agents*
Advisor: Prof. Arash Mohammadi

B.Sc. in Electrical and Computer Engineering, Sharif University of Technology, Iran *(2013- 2017)*

- GPA: 16.04/20
- Thesis: *Person Identification Using EEG Signals*
- Advisor: Prof. Mohammad B. Shamsollahi
- Ranked 1st (50,000 participants) in the National University Entrance Exam ("Konkour")

SELECTED COURSES

Current Algorithms in Reinforcement Learning, University of Toronto, A+

Neural Networks and Deep Learning, University of Toronto, A+

Introduction to Machine Learning, University of Toronto, A+

Medical Image Processing, Concordia University, A

Probability and Stochastic Process, Concordia University, A+

Data Mining, Concordia University, A

TECHNICAL SKILLS

Machine Learning: Reinforcement Learning, Neural Networks, Generative Models, Active Inference, Bayesian Learning

Programming Languages: Python (Tensorflow, Pytorch, Keras, Gym, CUDA, Scikit-learn, PySpark), Matlab, SQL

Tools & Technologies: Git, Linux, AWS (SageMaker)

HONORS and AWARDS

Nominated for the Best Ph.D. Dissertation Awards, University of Toronto *(2024)*

Ontario Graduate Scholarship ($10,000), University of Toronto *(2021)*

The Best Master's Thesis Award ($10,000), Concordia University *(2020)*

Graduate Entrance Awards ($5,000), Concordia University *(2018)*

National Elites Foundation (INEF)'s Grant, Iran *(2013-2017)*

Ranked 1st (50,000 participants) in the Iranian University Entrance Exam ("Konkour"), Iran *(2013)*

Semi-finalist of the Iran National Mathematics Olympiad, Iran *(2012)*

PROFESSIONAL EXPERIENCE

AI Researcher, Rotman's FinHub, Toronto, Canada *(May 2023-present)*

Modeled financial markets and conducted literature reviews to develop risk-aware reinforcement learning solutions for hedging risk, using Python.

- Created a novel loss function with interpretable parameter adjustments for training risk-aware reinforcement learning algorithms, reducing model tuning time.
- Developed and implemented a distributional reinforcement learning algorithm, increasing resilience to risk compared to existing state-of-the-art risk-aware models.
- Integrated Bayesian GANs into distributional reinforcement learning to enhance market robustness and generate synthetic data for quicker model deployment.
- Published research findings at ICASSP 2024 and have submitted to the International Conference on AI in Finance (ICAIF) 2024 and AAAI 2025.

AI Researcher, Dormakaba, Montreal, Canada *(Jan. 2019- Jan. 2021)*

Conducted literature reviews and developed machine learning models in Python to enhance the security of electronic access systems using mobile Bluetooth signals.

- Develop a real-time machine learning model to localize user relative to the access system with high precision (5 cm error) and make dynamic access decisions, increasing system accuracy.
- Leveraged reinforcement learning models to refine the system access decisions, reducing the error rate.

RESEARCH EXPERIENCE

Graduate Research Assistant, Bell Multimedia Lab, The Edward S. Rogers Sr. Department of Electrical and Computer Engineering, University of Toronto, Canada *(Sep. 2020-present)*

This research focuses on advancing efficiency and safety of autonomous decision-making agents by developing uncertainty-guided and transfer learning techniques within reinforcement learning and active inference.

- Developed innovative transfer learning algorithms that enable autonomous agents to efficiently transfer prior knowledge from one task to another, significantly enhancing time and memory efficiency.
- Leveraged Bayesian reinforcement learning and active inference approaches to handle uncertainty during decision making, enhancing robustness in changing environments.
- Resulted in peer-reviewed publications in 2 Neurocomputing journals, presentations at 2 ICASSP conferences, and 1 Neural Computation journal.

Graduate Research Assistant, I-SIP Lab, Department of Engineering and Computer Science, Concordia university, Montreal, Canada *(2018-2020)*

This research focused on advancing self-localization and localized decision support systems for autonomous agents.

- Developed machine learning classification techniques on Bluetooth signals for localizing agents in indoor environments, achieving high-precision user localization.
- Created a novel decision-making algorithm by leveraging Bayesian multi-model learning in reinforcement learning, improving sample efficiency.
- Contributed to the field with multiple peer-reviewed publications in IEEE ACCESS journal, ICASSP conference, European Signal Processing Conference, and IEEE Signal Processing Letter.

Undergraduate Research Assistant, Biomedical Signal and Image Processing Laboratory (BiSIPL), Department of Electrical Engineering, Sharif university of Technology, Tehran, Iran *(2013-2018)*

- Planned and set up experiments to gather EEG data using a mobile sensor.
- Employed machine learning and feature selection algorithms for biometric person identification using EEG data.

REFEREED PUBLICATIONS

Journals Articles (5 total)

(Accepted) **P. Malekzadeh**, K. N. Plataniotis, “Active Inference and Reinforcement Learning: A unified inference on continuous state and action spaces under partial observability”, *Neural Computation* (2024).

P. Malekzadeh, M. Hou, and K. N. Plataniotis, " Uncertainty-aware transfer across tasks using hybrid model-based successor feature reinforcement learning", *Neurocomputing* (2023).

P. Malekzadeh, et al., "AKF-SR: Adaptive Kalman Filtering-based Successor Representations", *Neurocomputing* (2022).

P. Malekzadeh, et al., "MM-KTD: Multiple Model Kalman Temporal Differences for Reinforcement Learning," *IEEE Access* (2020).

P. Malekzadeh, et al., "STUPEFY: Set-Valued Box Particle Filtering for Bluetooth Low Energy-Based Indoor Localization," *IEEE Signal Processing Letters* (2019).

Conference Articles (13 total)

(In Preparation) **P. Malekzadeh,** et al., "Robust Hedging through GAN-based Distributional Reinforcement Learning," *AAAI* (2025).

(Submitted) **P. Malekzadeh,** et al., "EX-RL: EXtreme Reinforcement Learning for Enhancing Financial Hedging Strategies," *International Conference on AI in Finance* (2024).

P. Malekzadeh, et al. "Robust Quantile Huber Loss with Interpretable Parameter Adjustment in Distributional Reinforcement Learning," *IEEE ICASSP* (2024).

P. Malekzadeh, M. Hou, and K. N. Plataniotis, "A Unified Uncertainty aware exploration: Combining Epistemic and Aleatory Uncertainty," *IEEE ICASSP* (2023).

M. Salimibeni, **P. Malekzadeh**, et al., "MAKF-SR: Multi-Agent Adaptive Kalman Filtering-based Successor Representations," *IEEE ICASSP* (2021).

M. Atashi, **P. Malekzadeh**, et al., "Orientation-Matched Multiple Modeling for RSSI-based Indoor Localization via BLE Sensors," *European Signal Processing Conference* (2021).

M. Atashi, M. Salimibeni, **P. Malekzadeh**, et al., "IoT-TD: IoT Dataset for Multiple Model BLE-based Indoor Localization/Tracking," *European Signal Processing Conference* (2021).

P. Malekzadeh, et al., "Non-Gaussian BLE-Based Indoor Localization Via Gaussian Sum Filtering Coupled with Wasserstein Distance," *IEEE ICASSP* (2020).

M. Salimibeni, **P. Malekzadeh**, K. N. Plataniotis, A. Mohammadi, "Distributed Hybrid Kalman Temporal Differences for Reinforcement Learning," *Asilomar Conference on Signals, Systems and Computers* (2020).

P. Malekzadeh, et al., "Gaussian Mixture-based Indoor Localization via Bluetooth Low Energy Sensors," *IEEE SENSORS* (2019).

S. Mehryar, **P. Malekzadeh**, et al., "Belief Condensation Filtering for RSSI-Based State Estimation in Indoor Localization," *IEEE ICASSP* (2019).

M. Salimibeni, **P. Malekzadeh**, et al., "Event-Triggered Monitoring/Communication of Inertial Measurement Unit for IoT Applications," *IEEE SENSORS* (2019).

M. Atashi, M. Salimibeni, **P. Malekzadeh**, et al., "Multiple Model BLE-based Tracking via Validation of RSSI Fluctuations under Different Conditions," *International Conference on Information Fusion* (2019).

TEACHING EXPERIENCE

Lab Assistant of **Adaptive control and Reinforcement Learning**, ECE411, University of Toronto *(2022-2024)*

Lab Assistant of **Linear Algebra**, MAT188, University of Toronto *(2022-2024)*

Head Teaching Assistant of **Probability and Applications**, ECE302, University of Toronto *(2020-2024)*

Teaching Assistant of **Algorithms and Data Structure**, ECE345, University of Toronto *(2021)*

Teaching Assistant of **Numerical Algorithms for Mathematics**, CSCC37, University of Toronto *(2021- 2022)*

Teaching Assistant of **Introduction to Machine Learning**, ECE421, University of Toronto *(2020-2021)*

Teaching Assistant of **Calculus II**, MATH 205, Concordia University *(2018)*

ACADEMIC and ADMINISTRATIVE SERVICE

Reviewer: ICASSP 2020 and 2022, IEEE signal processing letter, Machine Learning with Applications, Neurocomputing

Academic advisor to undergraduate engineering students, University of Toronto *(2021-2023)*

Editor of high school mathematics textbooks, Kheili Sabz Publication Center, Iran *(2017-2018)*

PROFESSIONAL DEVELOPMENT

- Generative AI with Large Language Models - Coursera *(2024)*
- AWS Certified Machine Learning Specialty - Udemy *(2024)*
- TEP1203H: Teaching Engineering in Higher Education, University of Toronto *(2023)*
- SQL Masterclass: SQL for Data Analytics- Udemy *(2020)*

REFERENCES

Konstantinos N. Plataniotis (Ph.D. advisor), Professor @ University of Toronto kostas@ece.utoronto.ca

Ervin Sejdic, Professor @ University of Toronto ervin.sejdic@utoronto.ca

Parham Aarabi, Professor @ University of Toronto p@arh.am

Arash Mohammadi (M.Sc. advisor), Professor @ Concordia University arashmoh@encs.concordia.ca