Shadan Golestan

PhD in Computer Science, University of Alberta

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SUMMARY

I am a Postdoctoral Researcher in the Computer Science department at the University of Alberta, where I focus on advancing research in sequential decision-making, optimization, and autonomous systems. My expertise lies in Reinforcement Learning, Foundation Models, and Large Language Models, utilizing cutting-edge frameworks such as PyTorch. I also mentor team members, guiding them in applying these technologies to complex, real-world challenges. My PhD research, also from the University of Alberta, investigated the intersection of Bayesian Optimization and simulation methodologies, laying the groundwork for innovative approaches in AI-driven decision-making. Additionally, I am a skilled communicator with a proven track record of publishing research and delivering compelling presentations.

EDUCATION

Doctor of Philosophy, Computer Science — Sep 2017 – Jun 2023

University of Alberta

- Research Areas: Machine Learning, Sequential Decision-Making, Black/Grey-box Bayesian Optimization, and Sensor and human behavior modeling.

Master of Science, Artificial Intelligence and Robotics — Sep 2014 – Sep 2017

University of Tehran

- Research Areas: Machine Learning, Intelligent Rehabilitation Systems, Human-centered AI

Bachelor of Science, Computer Software Engineering — Sep 2008 – Nov 2013

Arak University

- Final Project: An HCI Framework for deaf-mute people: Sign-language Detection with Microsoft Kinect and Dynamic Time Warping

JOB EXPERIENCE

Postdoctoral Researcher, University of Alberta — Jan 2024 – current

Reinforcement Learning

- Sequential decision making algorithms for machine adaptation.
  - **Tools** Python, MuJoco, Gym

Deep Learning Intern, ShopHopper — (four months) May 2022 – Aug 2022

- Designed a model using **CNN** and **transfer learning** to detect products specifications. Significant performance improvement was observed by combining these predictions with those generated by **NLP** techniques.
  - **Tools** Python, PyTorch, scikit-learn, SpaCy, YOLO
  - **Supervised** a group of five computer science interns to reach milestones.

Data Scientist Intern, Visier INC. — (eight months) Sep 2020 – Apr 2021

- Analysed **machine learning model** accuracy with respect to **data features**
- Studied **causality** of features with respect to the performance of prediction models. We found important features for different groups of customers
  - **Tools** Python, AWS Sagemaker

SELECTED PUBLICATIONS (see the complete list)

- **Golestan, S.**, Ardakanian, O., and Boulanger, P. "Grey-box Bayesian Optimization for Sensor Placement in Assisted Living Environments," AAAI, 2024.
- Taghian, M., Miwa, S., Mitsuka, Y., Gnther, J. **Golestan, S.**, Zaane, O. "Explainability of deep reinforcement learning algorithms in robotic domains by using Layer-wise Relevance Propagation," Engineering Applications of Artificial Intelligence, 2024.
- Schoepp, S., Taghian, M., Miwa, S., Mitsuka, Y., **Golestan, S.**, Zaane, O. "Enhancing Hardware Fault Tolerance in Machines with Reinforcement Learning Policy Gradient Algorithms," Engineering Applications of Artificial Intelligence, 2024 (under review).
- Sufiyan, Z., **Golestan, S.**, Miwa, S., Mitsuka, Y., Zaane, O. "A Study of the Efficacy of Generative Flow Networks for Robotics and Machine Fault-Adaptation," Engineering Applications of Artificial Intelligence, 2024 (under review).
- **Golestan, S.**, Stroulia, E., and Nikolaidis, I., "Smart Indoor Space Simulation Methodologies: A Review," IEEE Sensors Journal, 2022.
- **Golestan, S.**, Nikolaidis, I., and Stroulia, E., "Towards a Simulation Framework for Smart Indoor Spaces." Sensors, 2020.
- **Golestan, S.**, Kazemian, S., and Ardakanian, O., "Data-Driven Models for Building Occupancy Estimation," ACM e-Energy, 2018.
- **Golestan, S.**, Mahmoudi-Nejad, A., and Moradi, H., "A Framework for Easier Designs: Augmented Intelligence in Serious Games for Cognitive Development," IEEE Consumer Electronics Magazine, 2019.
- **Golestan, S.**, Soleiman, P., and Moradi, H., "Feasibility of using Sphero in rehabilitation of children with autism in social and communication skills," ICORR, 2017.

RESEARCH EXPERIENCE

Sequential Decision-Making

- **Reinforcement Learning for Robot Fault Adaptation:** Explainability of deep reinforcement learning algorithms Ablation Study of Reinforcement Learning Policy Gradient Algorithms Generative Flow Networks and Reinforcement Learning Comparison
- **Bayesian Optimization:** Proposed a novel black-box optimization framework using Bayesian Optimization. Our framework produces sensor configurations that can detect indoor activities significantly more accurate than state-of-the-art methods.
  - **Tools:** Python, OpenBox, PyTorch, scikit-learn
- **Grey-box Bayesian Optimization:** Proposed a novel grey-box Bayesian optimization to learn the spatial distribution of inherent knowledge in the objective function. Our algorithm finds optimal solutions with significantly less number of expensive function queries.
  - **Tools:** Python, OpenBox, PyTorch, scikit-learn

Data-driven Predictive Modelling

- **Indoor Activity Recognition:** Used Probabilistic Random Forest (PRF) for predicting occupants activities using motion sensors. We found that occupants leave distinct enough trace in sensor readings
  - **Tools:** Python, scikit-learn
- **Data-Driven Models for Occupancy Estimation:** Particle Filter and Neural Networks were used for occupancy estimation. The models accurately temporally predict the number of occupants in each room.
  - **Tools:** MATLAB, Neural Network Time Series Toolbox

Simulation Methodologies

- **Smart Indoor Space Simulation Methodology:** Designed a high-fidelity simulator that models human and sensor behaviours
  - **Tools:** Unity3D, C#

TECHNICAL SKILLS

Programming Languages: Python, R, MATLAB, C++, C#
Professional Tools: Gym, BoTorch, PyTorch, TensorFlow,
Development Tools: VS Code, Jupyter Notebook, Git, AWS Sagemaker