Zahra Bashir

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Education

- **University of Alberta** 2021 – 2024
  M.Sc. Thesis-based in Computing Science, advised by Prof. Levi Lelis Edmonton, AB, Canada
  GPA: 3.8/4.0
  Research Topics: Neurosymbolic AI, Program Synthesis, Reinforcement Learning
- **Iran University of Science and Technology** 2016 – 2020
  B.Sc. in Computer Engineering, advised by Prof. Sauleh Eetemadi Tehran, Iran
  GPA: 3.82/4, ***Graduated with Honors***
  Research Topics: Bandits, Natural Language Processing

Publications

- *Learning Neuro-Augmented Domain-Specific Languages*
  – **Zahra Bashir**, David Aleixo, Kevin Ellis, Levi Lelis (Abstract, To be submitted to ICML 2025[1])
- *Revisiting the Assessment of Programmatic Policy Interpretability: Insights from Human Evaluation*
  – **Zahra Bashir**, Michael Bowling, Levi Lelis (Oct 2024 - Under Review at ICLR 2024)
- *Assessing the Interpretability of Programmatic Policies using Large Language Models*
  – **Zahra Bashir**, M. Bowling, L. Lelis (Reinforcement Learning Conference (RLC) InterpPol Workshop, June 2024)

Research Experience

- **Research Collaborator**, Cornell University, *Remote* May 2024 – Present
  – Working on Neurosymbolic Language Augmentation for Adaptive Program Synthesis. *Advisor: Kevin Ellis*
- **AI Researcher**, University of Alberta / Amii May 2024 – May 2025
  – Working on two research papers: 1) Extended version of Interpretability Assessment, and 2)Learning Neural Languages with Tokenized Representation. *Advisor: Levi Lelis*
- **Graduate Research Assistant**, University of Alberta Jan 2023 – Apr 2024
  – Worked on assessing the interpretability of programmatic policies. *Advisor: Levi Lelis*
  – Enhanced programmatic policies for playing MicroRTS through combined tree-search and NN techniques.
- **CS Research Mentorship Program (CSRMP) Scholar**, Google Sep 2022 – Feb 2023
  – Developed research skills and collaborated with Google research teams under the guidance of a Google AI Resident.
- **Research Assistant**, University of Alberta May 2021 – Dec 2022
  – Applied differential privacy to time-series data generation to prevent sensitive data leakage. *Advisor: Nidhi Hegde*
- **Machine Learning Researcher (Internship)**, Iran University of Science and Technology Jun 2019 – Oct 2019
  – Worked on Persian image captioning using the "Show, Attend, and Tell" model, tackling challenges of Persian's distinct grammar structure. *Advisor: Naser Mozayyani*

Work Experience

- **Machine Learning Intern**, Alberta Machine Intelligence Institute (Amii) May 2022 – Sep 2022
  – Supported the industry team by advising companies and clients on applying ML to real-world problems.
  – Conducted a literature review on MLOps tools such as Snowflake, dbt, Amazon S3, and Metaflow, testing them on basic tasks. *Supervisor: David Chan*
- **ML Project Validator**, Alberta Machine Intelligence Institute (Amii) Feb 22 – Apr 22, Nov 23 – Feb 24
  – Conducted literature search on machine learning techniques that could be applied as ML solutions for specific client cases. *Topics included: RAG, LLMs, Chatbots.*
- **Data Science Intern**, Sharif Plus (University-based Startup) Jul 2020 – Dec 2020
  – Developed a GAN-based approach (LSTM/CNN) for a prediction task on a time-series dataset and used reinforcement learning for online hyperparameter optimization.
- **Developer and Technical Manager**, Chillin Wars AI Contest Sep 2018 - Feb 2019
  – Led the technical team for Iran University of Science and Technology's **ChillinWars AI contest**, an annual well-known AI-programming competition.
  – Worked as a full-stack developer of the **Junior Game** for this competition, utilizing its exclusive framework.
- **Back-end Developer**, D&C (Ravandyar) Jun 2018 – Sep 2018
  – Developed blockchain-based apps (wallets) using Django Rest.

[1]The preprint will be out on my website soon.

Invited Talks and Presentations

- **Reinforcement Learning Conference (RLC) InterpPol Workshop - Amherst, MA** Aug 2024
  - Oral presentation of: *"Assessing the Interpretability of Programmatic Policies using Large Language Models"*. [SLIDES, POSTER]
- **RLAI Summit 2024 - University of Albrta/Amii** Aug 2024
  - Presentation on *"Learning Neurosymbolic Languages to Solve Reinforcement Learning Problems"*. [SLIDES]
- **Upper bound 2023 - Neurosymbolic Programming Workshop** May 2023
  - Exploring the idea of "Using LLMs to Understand Programmatic Policies". [SLIDES]

Research Interests

- Machine Learning
- Reinforcement Learning
- Neurosymbolic ML
- Planning
- Program Synthesis
- Explainability/Interpretability

Teaching Experience

- **Search and Planning in AI & Foundation of Computation II** Jan 2021 – April 2024
  - Facilitated collaborative lab sessions to address coding challenges and conceptual issues for these two courses.
  - Marked assignments and exams.
- **Teaching Assistant for 9 Entry/Medium Level Courses** Sep 2017 – May 2020
  - List of courses: Theory of Languages & Automata, Computational Intelligence, Artificial Intelligence, Discrete Math, Signal & Systems, Software Engineering , System Analysis, Programming Basics.
  - Held workshops and teaching sessions, conducted labs, designed and marked assignments (e.g., course link).
  - Recognized as one of the best TAs according to student rankings and evaluated as the most helpful one.

Selected Projects

- **Combinatorial Game Theory-informed Strong Clobber 1-d Solver** (Github Link)
  - Studied and implemented various CGT techniques to create the strongest solver possible in speed and correctness.
  - Verified some hypotheses about game values, and found some interesting game values.
- **Private Time-Series Dataset Generation**
  - Studied privacy in time-series with the goal of releasing a private query (histogram/aggregate information) for a time-series dataset using two approaches: TimeGAN (model-based approach) and MQM (data-driven approach).
- **Adversarial Attacks on Language Models Using Text-GAN** (GitHub Link)
  - Applied adversarial attacks on the victim language model using a GAN, in a lower dimensional space, to generate adversarial examples.
  - Achieved an average accuracy of 89.95% in the test stage.
- **Generating Differential Private Synthetic Data** (GitHub Link)
  - Implemented 3 differentially private GANs (PATE, DP, SPRINT), and applied the PATE method on CGAN.
  - Achieved the highest precision (0.93%) and accuracy (0.83%) for the PATE-ACGAN model compared to other state-of-the-art models.
- **NRLP, Propaganda Detection using Multi-Armed Bandit Algorithms** *BSc final Project*
  - Detection of Propaganda Techniques in News Articles (GitHub Link)
  - Used Thompson Sampling for propaganda-field detection. (Presentation Link)
- **Selected Course Projects (2016-2020)**
  - Designed a noise-robust image detection model using **Hopfield Network**. (GitHub Link)
  - Solved the Inverted Pendulum problem using **Fuzzy Logic** and RL in Gym. (GitHub Link)
  - Applied **Genetic Algorithm** to find polynomial equation roots. (GitHub Link)
  - Implemented **Kohonen's** Self-Organizing Feature Map (SOFM) to map 3D data into 2D space(GitHub Link)
  - Additional Computer Vision and NLP projects: (Smile Detection), (political vision detection), (Face Recognition)

Awards and Honors

- Admitted to the DLRL2024 Summer School Organized by CIFAR/Vector *2024*
- Consistently ranked **top three** among 100 students throughout my bachelor's program *2016-2020*
- Received Best Teaching Assistant Award based on students evaluations. *2019*
- Main member of the **ACM ICPC team** of the Computer Engineering department. *2017*
- Ranked within the **top 0.2%** of the candidates in the "Iranian University Entrance Exam" for bachelor's degree. *2016*
- Awarded the first place in the Provincial Computer Olympiads, securing a spot in the national competition *2014*

Volunteer Experience

Member of Computer Engineering Scientific Association (CESA) *Sep 2018 - Sep 2019*
Member of Iranian Students Association University of Alberta (ISAUA) *Nov 2021 - Nov 2022*