

Zahra Bashir

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Education

- **University of Alberta** 2021 – 2024
M.Sc. Thesis-based in Computing Science, advised by Prof. Levi Lelis
GPA: 3.8/4.0
Research Topics: Neurosymbolic AI, Program Synthesis, Reinforcement Learning
Edmonton, AB, Canada
- **Iran University of Science and Technology** 2016 – 2020
B.Sc. in Computer Engineering, advised by Prof. Sauleh Eetemadi
GPA: 17.75/20, **Graduated with Honors*
Research Topics: Bandits, Natural Language Processing
Tehran, Iran

Publications

- *Learning Neuro-Augmented Domain-Specific Languages*
– **Zahra Bashir**, David Aleixo, Kevin Ellis, Levi Lelis (Abstract, To be submitted to ICML 2025¹)
- *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) InterPol Workshop, June 2024)

Research Experience

- **Research Intern**, 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 Interpretability Assessment Paper, 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.

¹The 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
- Neurosymbolic ML
- Program Synthesis
- Reinforcement Learning
- Planning
- 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 (ISAU) *Nov 2021 - Nov 2022*