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: 3.9/4.0
  Research Topics: Reinforcement Learning, Neurosymbolic AI, Program Synthesis

- **Iran University of Science and Technology** — 2016 – 2020
  B.Sc. in Computer Engineering, advised by Prof. Sauleh Eetemadi — Tehran, Iran
  GPA: 3.8/4.0, *Graduated with Honors*
  Research Topics: Bandits, Natural Language Processing

Selected Publications

- *Learning Neurosymbolic Languages to Solve Reinforcement Learning Problems*
  - **Zahra Bashir**, David Aleixo, Kevin Ellis, Levi Lelis (To be submitted to ICML 2025[1])

- *Revisiting the Assessment of Programmatic Policy Interpretability: Insights from Human Evaluation*
  - **Zahra Bashir**, Michael Bowling, Levi Lelis (ICLR 2025 - Under Review)

- *Assessing the Interpretability of Programmatic Policies using Large Language Models*
  - **Zahra Bashir**, M. Bowling, L. Lelis (Reinforcement Learning Conference (RLC) InterpPol Workshop, June 2024)

Work Experience

- **Research Intern**, Cornell University — May 2024 – Present
  - Working on "Neurosymbolic Language Augmentation". (preprint will be ready soon) — *Advisor: Kevin Ellis*

- **AI Researcher**, University of Alberta / Amii — May 2024 – May 2025
  - Working on two research papers: 1) Neurosymbolic Language Augmentation (my internship topic), 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.

- **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.*

- **CS Research Mentorship Program (CSRMP) Scholar**, Google — Sep 2022 – Feb 2023
  - Cultivated research skills and explored collaboration opportunities with Google's research teams under the guidance of a Google AI Resident researcher.

- **Research Assistant**, University of Alberta — May 2021 – Dec 2022
  - Worked on privacy in time-series data generation to prevent sensitive data leakage. — *Advisor: Nidhi Hegde*

- **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 parameter optimization.

- **Machine Learning Researcher (Internship)**, Iran University of Science and Technology — Jun 2019 – Oct 2019
  - Implemented Persian image captioning with the "Show, Attend, and Tell" model, given the distinct grammar structure of the Persian language. — *Advisor: Naser Mozayyani*

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[1]The initial draft is ready.

- **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.

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]
- **Reverse Expo Ualberta - AI4Society**   February 2022
  - Talked about Privacy in Time-Series Datasets. [POSTERS: 1, 2]

Research Interests

- Machine Learning
- Reinforcement Learning
- Neurosymbolic AI
- Explainability/Interpretability
- Program Synthesis/Formal Methods
- AI for science

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 Anaylsis, 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 different approaches: TimeGAN (a model-based approach) and MQM (a 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 student 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*

Skills

Programming Languages	Python, C++, Java, C, HTML, MATLAB, SQL
Learning Tools	Jax, TensorFlow, PyTorch, Numpy, Pandas, Keras, Scikit-learn
Frameworks & Libraries	Django-Rest, Flask, PyGame
Other Tools	Linux, Git, Bash, PostgreSQL, Docker, UML, Unity 3D