Elaheh Toulabinejad

toulabin@ualberta.ca ellietoulabi elaheh-toulabi-nejad Elaheh Toulabinejad

EDUCATION

Master of Science in Computing Science *Sep 2023 - Now*
Department of Computing Science, University of Alberta, Edmonton, Canada
Supervisor: James R. Wright

Bachelor of Science in Computer Engineering *Sep 2017 - Sep 2021*
Department of Electrical and Computer Engineering, Isfahan University of Technology, Isfahan, Iran
Supervisors: Mohammad Hossein Manshaei, Sayed Jalal Zahabi

RESEARCH INTERESTS

• Machine Learning and Deep Learning • Game Theory • Reinforcement Learning • Cognitive Science

PUBLICATION

- **A deep learning model of dorsal and ventral visual streams for DVSD**
  Masoumeh Zareh, **Elaheh Toulabinejad**, Mohammad Hossein Manshaei, Sayed Jalal Zahabi
  Scientific Reports (Nature Publishing Group), Volume 14, Pages 27464
  November 2024

- **Supervised discretization of continuous-valued attributes for classification using RACER algorithm**
  Elaheh Toulabinejad, Mohammad Mirsafaei, Alireza Basiri
  Expert Systems with Applications , Volume 244, Pages 121203
  June 2024

RESEARCH EXPERIENCE

Graduate Research Assistant *May 2024 - Present*
University of Alberta, Supervisor: James R. Wright
Conducting research to develop a **behavioral game theory** framework for modeling **multi-agent strategic interactions**.

Research Assistant *Nov 2021 - Aug 2022*
Isfahan University of Technology, Supervisor: Alireza Basiri
Enhanced the RACER **classification algorithm** by addressing its limitations in managing continuous attributes, leading to improved performance.

Research Assistant *Oct 2021 - Aug 2022*
Isfahan University of Technology, Supervisor: Mohammad Hossein Manshaei
Developed and implemented a biologically plausible **deep learning model of the human visual system**, encompassing both ventral and dorsal pathways.
Simulated dorsal stream impairments associated with **cerebral visual impairment (CVI) and Autism**, exploring the impact of learning on recovery of synaptic disruptions in the dorsal visual stream.
Investigated neuronal interactions in healthy individuals versus those with Autism and Alzheimer's using **reinforcement learning** and **game theory** frameworks.

TEACHING EXPERIENCE

Graduate Teaching Assistant *Sep 2023 - April 2024*
University of Alberta
CMPUT 174 - Introduction to the Foundations of Computation I
CMPUT 291 - Introduction to File and Database Management
CMPUT 361 - Introduction to Information Retrieval

Undergraduate Teaching Assistant *Sep 2018 - June 2019*
Isfahan University of Technology
Advanced Programming
Computer Programming Fundamentals (two times)

WORK EXPERIENCE

Work Integrated Learning Participant *Oct 2024 -Jan 2025*
Alberta Machine Intelligence Institute (Amii)
Participated in a WILO with the Amii industry team to develop a workplace safety solution leveraging **time series forecasting** to predict potential hazards.

Machine Learning Engineer *Nov 2022 -July 2023*
Behin Sanaat Arsha Company
Utilized machine learning for **fault diagnosis** of power transformers using dissolved gas analysis.

Machine Learning Researcher *Aug 2022 - Oct 2022*
Vira Vision Company
Utilized machine learning to develop a smart to-do list application that suggests an arrangement of tasks based on a person's personality characteristics and mood, as well as the task's properties

Software Engineering Intern *July 2020 - Sep 2020*
Behin Sanaat Arsha Company
Designed and implemented a complete cycle of creating an online shop web application including database design and implementation, back-end and front-end design and implementation, test, and deployment.

AWARDS AND HONORS

- Awarded University of Alberta Graduate Recruitment Scholarship
- Awarded national undergraduate full scholarship.
- Ranked among the **Top 2%** of +150000 participants in the undergraduate Iranian university entrance exam.
- Accepted in First Stage of National Literature Olympiad 2015.
- Accepted in First Stage of National Literature Olympiad 2014.
- Accepted in the National Organization for Development of Exceptional Talents (NODET) Nationwide Entrance Exam.

CERTIFICATES

- Natural Language Processing with Classification and Vector Spaces (Coursera)
- Natural Language Processing with Probabilistic Models (Coursera)
- Natural Language Processing with Sequence Models (Coursera)
- Fundamentals of Reinforcement Learning (Coursera)
- Sample-based Learning Methods (Coursera)

SKILLS

Programming Languages:	Python, C/C++, PHP, Go, T-SQL, MATLAB, JavaScript, Bash
Technical Skills:	Machine Learning, Deep Learning, Data Mining, Data Visualization, ML Algorithms PyTorch, Tensorflow, Keras, JAX, Matplotplib, Numpy, scikit-learn, SciPy, seaborn, Pandas Software Design & Architecture, Database Design, Agile Methodology HTML, CSS, Bootstrap, JQuery, Laravel, Flask, PostgreSQL, MySQL, Nginx
Software & Tools:	Git, Docker, LaTeX, MATLAB, Colab, Anaconda, Jupyter, Microsoft SQL Server
Operating Systems:	Windows, Linux

NOTABLE PROJECTS

External Regret Minimization in Extensive-form Games With Imperfect Information [GitHub]
Provided a comprehensive survey of the **Counterfactual Regret (CFR) minimization** algorithm, its variations, and their effectiveness in overcoming CFR's limitations. Concluded with an analysis of the drawbacks of these methods and proposed potential directions for future research.

Decoding Neural Representations of Sentences in Individuals with Autism [GitHub]
Conducted a study using **fMRI data** to explore the alignment between **brain representations** and **semantic representations in a language model** for various sentence types among **autistic** individuals. Additionally, compared metaphor representations between autistic and non-autistic participants to identify similarities and differences.

Decoding Emotions: An In-Depth Exploration of Sentiment Detection through EEG Signal Analysis [GitHub]
Utilized AI methods, including **machine learning** and **deep learning**, to identify **emotions from EEG signals**. Investigated the impact of specific EEG signal features on model performance. Explored **neural activity within specific brain regions** in individuals as they experienced emotions, providing valuable insights into the underlying cognitive processes.

Loss of Plasticity [GitHub]
Investigated the role of **activation functions** in mitigating **plasticity loss** in **Deep Q-Networks (DQN)** by exploring two distinct activation functions: Concatenate ReLU and Leaky ReLU. Conducted experiments in the Dancing Catch environment to evaluate their impact on learning performance.

Birth Weight Prediction [GitHub]
Designed and developed **data mining** solutions to predict the weight of newborns at birth using the **CRISP-DM** process model.

VOLUNTEER EXPERIENCE

Vice President *June 2018 - April 2019*
Isfahan University of Technology Computer Engineering Student Scientific Association (IUTCESSA)
Participated in organizing workshops, publication of the *Faramatn* journal, and other voluntary activities.