Taraneh Ghandi

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Education

McMaster University — *Hamilton, ON, Canada*

PhD in Computational Science and Engineering — September. 2023 - Ongoing

Expected Graduation: Summer 2027

Supervisor: Dr. Hamidreza Mahyar

GPA:4/4

Ferdowsi University of Mashhad (FUM) — *Mashhad, Iran*

M.Eng. in Computer Engineering — October. 2020 - February 2023

Supervisor: Dr. Hamidreza Pourreza

GPA: 19.24/20 (4/4). Ranked 1st among all students, class of 2022

Ferdowsi University of Mashhad (FUM) — *Mashhad, Iran*

B.Eng. in Computer Engineering — September. 2016 - October. 2020

GPA: 18.54/20 (3.77/4). Ranked 5th among all (120) students, class of 2020

Research Interests

Large Language Models (LLMs), Large Reasoning Models, Multimodal Large Language Models (MLLMs), Knowledge Graphs, Graph Neural Networks, Computer Vision,

Natural Language Processing, Deep Learning, Machine Learning

Technical Skills

Programming & Libraries	Python, LangChain, Weights & Biases, PineCone, AWS, Cross-Platform Programming **Also:** Linux and Git
Professional Softwares	Unity, QT Creator, Android Studio
Languages	English (Professional working proficiency) Persian (Native)

Research Experiences

Graph Reasoning with Large Language Models

Thesis - Supported by BASF Canada — March 2025 - Ongoing

- **The true essence of reasoning isn't in knowing all the information in the world, but it is in knowing how to explore it.**
- There are many methods for grounding LLMs using Knowledge Graphs (KGs), but KGs are usually too large to fit in a single context. Also common queries ask about specific properties making it difficult to easily embed the information.
- An alternative approach is to provide the LLM with a number of tools by which it can navigate through the graph and collect the required information.
- As the first step, we designed a Benchmark to assess the reasoning capabilities of LLMs on large, enterprise-sized knowledge graphs.

Investigating the Influence of Personality Priming on LLM Performance

A collaboration with ETH Zürich — October 2024 - Ongoing

- Designed experiments to examine whether priming LLMs with specific personality traits leads to improvement in various tasks.
- Evaluated the performance of primed models on BIG-bench tasks for knowledge-reliant tasks
- Explored the impact of different personality types on the creativity of generated content using the WritingPrompts dataset, analyzing factors such as readability, personalness, redundancy, likability, believability, humor and emotional chargedness.

SagePlus Chat - Vector Institute / Leni (formerly RealSage)

Machine Learning Associate, Vector Institute FastLane Cohort 5 — May 2024 - August 2024

- Developed a ChatBot powered by LLMs capable of answering user questions regarding real estate enterprise data, providing insights on real estate data.
- SagePlus Chat takes advantage of domain expert knowledge along with capabilities of LLMs to provide accurate numerical data and insights.

Accident & Incident Reporting Classifier Enhancement

Research Intern, BASF Canada — March 2024 - August 2024

- Enhanced the accuracy of the classifier in BASF's accident and incident reporting system for plant operations, enabling more precise notifications across multiple departments.
- Collaborated with a multidisciplinary team to significantly improve predictive performance.
- Developed and deployed machine learning pipelines that contributed to faster incident detection and enhanced safety.

Foundational Models for Shape Understanding - McMaster University

Under the supervision of Dr. Hamidreza Mahyar and Dr. Morteza Rezanejad — January 2024 - August 2024

- Current Multimodal LLMs do not perform well in shape understanding tasks, e.g.: shape completion.
- Shape contours can be represented as sequential data for a foundation model, as an novel approach to teach the very concept of shapes to these models.

Deep Learning on Graphs for Natural Language Understanding in Conversational AI - BASF Canada

Research Intern - BASF Canada - Supported by Mitacs — September 2023 - ongoing

- Representing text as a mere sequence risks losing the structural information, whereas graphs can retain this structural insight.
- We intend to use natural question generation to understand what a user is trying to ask, knowledge base question answering to incorporate external knowledge into responses, and utilize dialogue state tracking to understand the state of the conversation.

Image Captioning as a Core Feature for a Vision Assistant

M.Eng. project, under the supervision of Dr. Hamidreza Pourreza and Dr. Hamidreza Mahyar — March 2022 - September 2023

- Hierarchical caption generation using scene graphs, GCNs and Transformers
- Captions must be detailed to suit the needs of visually impaired individuals.

Projects

ShoweringAI

(Personal Project) Fine Tuning a LLM (GPT-2). — Winter 2020

- A bot capable of generating short epiphanies that highlight the oddities within the familiar, in form of text.
- Top posts from the "r/ShowerThoughts" sub-reddit are scraped and used as training data for GPT-2.

Detecting Grasp Type for Robotic Hand Using Deep Learning and Machine Vision

B.Eng. final project, under the supervision of Dr. Hamidreza Pourreza and Dr. Alireza Akbarzadeh Tootoonchi — September 2019- October 2020

- Fine-tuned YOLOv3 on a custom dataset containing 13,144 objects for grasp type detection.
- The custom dataset was obtained from Open Images V6 and manually labeled.

The *MelBeatSo* Smart Music Recommendation System

Personal project topic proposed and executed as course project for the Multimedia Systems course — Winter 2020 - Summer 2020

- Recommends new musical pieces using multimedia factors such as: sentiment (using keywords in song title or lyrics), tempo, mood (detected using musical features).
- Word2Vec models are used to search semantically similar keywords in song lyrics.
- Facial Emotion Recognition applied on album art is used as a deciding factor to determine a song's mood.

The *MelBeatSo* Dataset: Creation, Data Mining and Clustering

Personal project topic proposed and executed as course project for the Data Mining course — Fall 2019 - Winter 2020

- The *MelBeatSo* dataset is a collection of 37 musical features computed for 4,828 musical pieces.
- The pieces are scraped from a popular online music platform called *RadioJavan*.

Publications

[1] **Taraneh Ghandi**, Hamidreza Pourreza, Hamidreza Mahyar. "Deep Learning Approaches on Image Captioning: A Review" ,38 pages, *ACM Computing Surveys, 2023, DOI: 10.1145/3617592*, [Link]

[2] Kamaledin Ghiasi-Shirazi, **Taraneh Ghandi**, Ali Taghizadeh, et al. "Revisiting 2-3 Red-Black Trees with a Pedagogically Sound yet Efficient Deletion Algorithm: The Parity-Seeking Delete Algorithm" , 17 pages, *Acta Informatica (June 2022, Under review)*. [Link]

Awards and Honors

September 2021	Selected as a Talented Student by Ferdowsi University of Mashhad to pursue M.Eng. without an entrance exam
October 2020	Selected as the Top Intern of the Computer Engineering Department at Ferdowsi University of Mashhad

Teaching Assistantship

Teaching Assistant: Deep Learning — *McMaster University*
W. Booth School of Engineering Practice and Technology — Fall 2024, Winter 2025

Teaching Assistant: Linear Algebra I — *McMaster University*
Department of Mathematics and Statistics, Faculty of Science — Winter 2025 (Current

Teaching Assistant: Algebra for Engineering — *McMaster University*
Department of Mathematics and Statistics, Faculty of Science — Fall 2024

Teaching Assistant: Data Mining — *McMaster University*
W. Booth School of Engineering Practice and Technology — Winter and Spring 2024

Teaching Assistant: Introduction to Mathematical Scientific Computation — *McMaster University*
Department of Mathematics and Statistics, Faculty of Science — Winter and Spring 2024

Teaching Assistant: Linear Algebra — *McMaster University*
Department of Mathematics and Statistics, Faculty of Science — Fall 2023

Teaching Assistant (Team Leader): Python Course — *Ferdowsi University of Mashhad*
Computer Engineering Department — Fall 2019, Winter and Spring 2020

References

- **Available upon request**