Samin Mahdipour

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Education

- **Université de Montréal** — Montreal, Canada
  M.Sc. in Computer Science - Artificial Intelligence — *Jan 2025- Current*
- **Amirkabir University of Technology** — Tehran, Iran
  B.Sc., Computer Engineering — *Feb 2021 - Aug 2024*
  - **Top Student**: GPA: 3.9 / 4.0 (U.S. grading system)

Research Interests

- **Machine Learning**
  - Deep Learning
  - Reinforcement Learning
  - NLP
- **Generative AI**
  - Foundation Models
  - Large Language Models
  - Multimodal Models
- **AI and Brain Sciences**
  - Neuroscience in AI
  - Cognitive Science in AI
  - Neurotechnology

Research Experience

- **Research Assistant — Cognitive Neuroscience Lab, Université de Montréal** — Jan 2025 - Current
  Supervisor: Prof. Karim Jerbi
  - **Achievement**: Researched neuro-inspired AI models, integrating LLMs for neural signal processing and creative cognition. Applied ML techniques to analyze brain connectivity and predict cognitive decline, bridging neuroscience and generative AI.
- **Researcher, Mila - Quebec AI Institute** — Nov 2024 - Current
  - **Achievement**: Focused on Generative AI, Foundation Models LLMs, Multimodal models, NLP and Cognitive Neuroscience
- **AI Specialist — Neuromatch** — Nov 2024 - Current
  - **Achievement**: Fine-tuning LLMs for Mental Health Challenges
- **Research Assistant — NLP Lab, Amirkabir University of Technology** — July 2023 - Nov 2024
  Supervisor: Prof. Saeedeh Momtazi
  - **Achievement**: Optimized NLU models like BERT, RoBERTa, and GPT for text classification, sentiment analysis, and conversational AI. Developed generative models (T5, BLOOM) for chatbot applications, focusing on dialogue state tracking and contextually adaptive responses.

Publications

"From Rule-Based to Hybrid Learning: Integrating LLMs for Effective Dialogue State Tracking"
S. Mahdipour, S. Momtazi, Under Preparation

"A Machine Learning Approach for Diagnosis and Classification of Periodontitis"
S. Mahdipour, M. Saligheh Rad, K. Kiani, N. Chiniforush, Under Preparation

Skills Summary

- **Languages:** Python, C/C++, Java, SQL/TSQL
- **Python Libraries:** OpenCV, Pandas, Matplotlib, Seaborn, TensorFlow, PyTorch, Keras, Transformers, LangChain, Scikit-learn, Gensim, spaCy, SciPy
- **Tools:** JupyterLab, Google Colab, Anaconda, Hugging Face, GitHub, Linux, Docker, Minikube, Apache Hadoop, SQL Server, MySQL, PostgreSQL
- **LLMs:** BERT, RoBERTa, GPT, Llama, T5, BLOOM, PaLM, Gemini

Projects

- **The Inattentive Interview: An LLM-Assisted Clinical Transcript Generation and Analysis (code)**: Gemini was instructed to transcribe, analyze and generate conversations for a therapy session focused on ADHD.
- **A Machine Learning Approach for Diagnosis and Classification of Periodontitis (code)**: Applied machine learning to classify and diagnose periodontitis using clinical data.
- **Diabetes Classification with KNN (code)**: A model evaluated to classify diabetes using KNN.
- **Parkinson Detection From Voice Data (code)**: Applied deep learning to detect Parkinson's disease using voice data.
- **Brain Tumor Detection (code)**: Used ML models to detect brain tumors using medical images.
- **Cancer Image Detection (code)**: Developed a deep learning model to identify metastatic cancer in pathology image patches.
- **Counseler Chatbot (code)**: Built a mental health chatbot that interacts with users using predefined conversational intents.
- **Dialogue State Tracking in Chatbot (code)**: Developing a hybrid chatbot framework integrating large language models such as BERT and GPT to improve dialogue state tracking for more accurate and responsive interactions.
- **Chit-Chat Conversational System (code)**: Developed a chitchat system by fine-tuning BERT for intent detection and slot filling and T5 for answer generation.
- **New York Airbnb Data Engineering (code)**: Cleaned and engineered features for predictive modeling on New York Airbnb data using classification algorithms and dimensionality reduction.
- **Market Basket Analysis(code)**: Applied Apriori and FP-Growth algorithms to uncover frequent itemsets and generate association rules for customer insights.
- **Advanced Classification for Gas Sensor Data (code)**: Optimized decision trees and Naive Bayes for classifying gas sensor data with tuned hyperparameters.
- **Advanced Clustering of Insurance Claims (code)**: Performed clustering using KMeans, Agglomerative Clustering, and DBSCAN, with PCA for dimensionality reduction.
- **Outlier and Anomaly Detection in Complex Datasets(code)**: Implemented One-Class SVM and Local Outlier Factor for anomaly detection and LSTM for temporal pattern recognition.
- **Machine Learning using MapReduce (code)**: Executed big data ML projects using MapReduce on a Hadoop cluster.
- **Multilayer Perceptron Neural Network (code)**: Implemented a neural network with Conv2D, FC layers, and various optimizers for unsupervised learning on the MNIST dataset.
- **Super Mario Game (code)**: Implemented a genetic algorithm to optimize performance in the Super Mario game.
- **Pacman (code)**: Developed a Pacman game using AI algorithms based on Stanford University's CS221 course.
- **Handwriting Detection (code)**: Used PCA and SVM to classify handwritten digits from the MNIST dataset.
- **Online Retail (code)**: Clustered U.S. housing data using k-means, DBScan, and Mean Shift algorithms.
- **Ad Click Prediction (code)**: Predicted website ad click-through rates using SVM, Naive Bayes, and KNN.
- **Heart Disease Prediction (code)**: Predicted heart attack risk using a dataset of medical indicators.
- **PlannerPAl(code)**: This project is an Android app for planning tasks.
- **BlueSky(code)**: This project is an Android app for checking some cities' Weather and Air quality.
- **Coin Price Monitoring(code)**: This project is a cryptocurrency price monitoring app. The project focuses on Docker, and Kubernetes deployment, and offers optional Docker Compose support.
- **Fuzzy Car Controller(code)**: This project focuses on implementing a fuzzy car controller using charts.
- **Super Mario Game (code)**: In this project, a genetic algorithm is implemented to excel in the Super Mario game by evolving an optimal "goal chromosome" strategy.
- **Persian Search Engine (code)**: This project, developed as part of the Information Retrieval course, implements a Persian search engine.
- **DFA, NFA, and Regular Expression Converters (code)**: This project is divided into three parts: DFA Acceptor, NFA to DFA Converter, and Regular Expression to NFA Converter.
- **Turing Machine (code)**: The goal of this project was to create a Turing machine that can compute the factorial of (3n+1), where 'n' is a non-negative integer.
- **Twitter(code)**: This project is a JavaFX-based sample version of Twitter, featuring account creation, following functionality, account switching, and various social activities like commenting, liking, and retweeting, available in both Light and Dark Mode GUIs.

Honors and Awards

* First Place – Mexa Competition (Neuromatch), supported by Google Health and Google DeepMind
* Professional Top Research and Talent, Mila - Quebec AI Institute
* Full-ride M.Sc. Scholarship, Université de Montréal
* Full-ride B.Sc. Scholarship, Amirkabir University of Technology
* Direct M.Sc. Admission for outstanding performance during undergraduate studies, Amirkabir University of Technology
* Top 5 Finalist, National Brain Bee Competition
* Ranked 129th Among GitHub Users in Iran
* Commercialized Persian Chatbot Assistant, AUT Think Event
* Best B.Sc. Project Winner, Amirkabir University of Technology

Certificates

- Programming in Python by Meta - (Certificate)
- Introduction to Artificial Intelligence (AI) by IBM - (Certificate)
- Introduction to Deep Learning and Neural Networks with Keras by IBM - (Certificate)
- Deep Learning using TensorFlow by IBM - (Certificate)
- Deep Neural Networks with PyTorch by IBM - (Certificate)
- Open Source Models with Hugging Face by Hugging Face - (Certificate)
- Introduction to Large Language Models by Google - (Certificate)
- Finetuning Large Language Models by DeepMind - (Certificate)
- Transformer Models and BERT Model by Google - (Certificate)
- Attention Mechanism by Google - (Certificate)
- Introduction to Generative AI by Google - (Certificate)
- Prompt Engineering with Llama 2 and 3 by Meta - (Certificate)
- ChatGPT Prompt Engineering by OpenAI (Certificate)
- Fundamentals of Machine Learning for Healthcare by Stanford University - (Certificate)
- Fundamental Neuroscience for Neuroimaging by Johns Hopkins University - (Certificate)
- Computational Neuroscience: Neuronal Dynamics of Cognition by EPFL - (Certificate)
- Digital Signal Processing 1: Basic Concepts and Algorithms by EPFL - (Certificate)

Extracurricular Activities

Volunteer Columnist, Pouyesh Magazine *Tehran, Iran*
Official magazine of the Computer Engineering student community at Amirkabir University of Technology *2020 - 2023*

Language Proficiencies

English IELTS Band 7.0 **French** A1 **Arabic** Beginner **Persian** Native

References

Karim Jerbi, Associate Professor
Member of Psychology Dept., UdeM, Montreal, Canada.
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Saeedeh Momtazi, Associate Professor
Member of Artificial Intelligence group, Computer Engineering Dept., AUT, Tehran, Iran.
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Ehsan Nazerfard, Associate Professor
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