Pegah Motaharinezhad

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Research Interests

NLP, Reinforcement Learning, Deep Learning, Machine Learning, Bioinformatics, Computer Vision

Education

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

B.S. in Computer Science *Sep. 2019 - Sep. 2024*

- CGPA (Overall): 16.34/20 (3.34/4)
- CGPA (Last Two Years): 17.65/20 (3.69/4.0)
- **Courses:** Artificial Intelligence, Fundamentals of Computational Intelligence, Data Mining, Fundamentals of Data Retrieval Web Searching, Data Structure and Algorithms, Algorithms Design and Analysis, Principles of Software Design, Linear Optimization, Graph Theory and its Application
- **Bachelor's Project:** "Enhancing Biomedical Relation Extraction: A BERT-Based Approach to Drug-Drug Interaction Detection" (see full details in the **Projects** section)

Farzanegan 2 (NODET) *Mashhad, Iran*

High-School Diploma in Mathematics *Sep. 2015 - Jun. 2019*

- CGPA: 19.18/20 (4/4)

Publications

Journal Articles

Solving the Fokker–Planck Equation with Neural Networks: A Performance Improvement
Hassan Dana Mazraeh, Pegah Motaharinezhad, Nafiseh Daneshian, Kourosh Parand
Analytical and Numerical Solutions for Nonlinear Equations pp. 1–11. 2024
DOI: 10.22128/ansne.2025.967.1130

Experience

Research Assistant

Ferdowsi University of Mashhad

- Conducted research on biomedical relation extraction, culminating in a BERT-based bachelor's thesis project. *Jun. 2024 - Sep. 2024*
- Developed Temporal-Graph Convolutional Networks for rental bike demand forecasting on London Bike sharing dataset. *Sep. 2023 - Sep. 2024*

Teaching Assistant

Ferdowsi University of Mashhad

- TA for *"Special Topics in Data Science"* under Prof. Jalal Nasiri.(Graduate-Level) *Feb. 2024 - Jul. 2024*
- TA for *"Fundamentals of Computer Programming"* under Prof. Soheila Ashkezari. *Sep. 2023 - Jan. 2024*
- TA for *"Fundamentals of Computer Programming"* under Prof. Soheila Ashkezari. *Sep. 2022 - Jan. 2023*

Internship

ICDS *Nov. 2022 - Apr. 2023*

- Hired as an Data Science intern after completing Data Science Summer School.

Selected Projects

Enhancing Biomedical Relation Extraction: A BERT-Based Approach to Drug-Drug Interaction Detection (Bachelor's Project)

- Developed a BERT-based NLP pipeline to detect Drug-Drug Interactions (DDIs) using the DDI Extraction 2013 dataset.
- Focused on drug name entity recognition (DNER) and DDI classification.

LLM-Aware Search and Ranking

- Engineered a semantic search pipeline that leverages sentence embeddings and KNN-based ranking to improve information retrieval for RAG-enhanced LLM applications. This system is designed to provide more contextually relevant results than traditional keyword-based search.

Amazon Product Crawler and Indexer

- Developed a Selenium-based web scraper to extract structured product data from Amazon.
- Indexed and visualized data using Elasticsearch and Kibana dashboards.

Multilingual Search Engine with TF-IDF and Jaccard Ranking

- Implemented an information retrieval system for English and Persian datasets with customizable query processing and scoring.

Flower Classification with Classical and Deep Learning Models

- Developed image classifiers for flower datasets using Random Forest with K-means feature extraction and CNN-based transfer learning.
- Compared performance of ensemble methods and fine-tuned deep models on small datasets. (Transfer Learning)

Machine Learning Model Implementations

- Built a suite of ML models (Decision Trees, Logistic Regression, LDA, KNN, Random Forest) for classification tasks using datasets such as Hoda (Persian digits), UCI Breast Cancer, and synthetic classroom data.
- Applied preprocessing, PCA for dimensionality reduction, and custom gradient descent for optimization visualization.

AI-Driven Othello Game

- Developed an AI agent for the Othello board game using Minimax, alpha-beta pruning, dynamic depth selection, Beam Search, and Transposition Tables.

Constraint Satisfaction Problem Solver

- Modeled and solved a CSP using Backtracking, Forward Checking, MRV, LCV, and AC3 algorithms.

Java-Based Compiler for the Dust Language

- Built a custom compiler in Java for the Dust language, including lexical analysis and syntax parsing.

Technical Skills

Programming Languages	Python, Java, C, C++, SQL
Frameworks & Libraries	NumPy, Pandas, Scikit-learn, PyTorch, TensorFlow, Transformers (Hugging Face), Matplotlib, Seaborn
Concepts	Text Classification, Transformers, LLMs, RAG, Deep Learning, GNNs, Supervised/Unsupervised Learning, Transfer Learning, Image Classification
Tools	Git, LaTeX, Elasticsearch

Courses

Notable Courses

Bachelor's Project, GPA: 20/20
Topics in Computer Science, GPA: 20/20
Computer Networks, GPA: 19.5/20
Computer Simulator, GPA: 19.5/20
Compiler, GPA: 18.25/20
Data Mining, GPA: 18.50/20
Numerical Linear Algebra, GPA: 18.10/20
Design and Analysis of Algorithms, GPA: 17.6/20
Linear Optimization, GPA: 17.5/20
Graph Theory and its Applications, GPA: 17.25/20

Online Courses

5-Day Gen AI Intensive Course with Google Learn Guide, Kaggle — *Currently Attending*
Reinforcement Learning, David Silver — *Currently Attending*
Machine Learning with Python, Coursera - IBM — *Show Credential*
Supervised Machine Learning: Regression and Classification, Coursera - DeepLearning.AI — *Show Credential*
Introduction to Data Science in Python , Coursera - University of Michigan — *Show Credential*
AI For Everyone, Coursera - DeepLearning.AI — *Show Credential*

Languages

English
Full Professional Proficiency, IELTS: 6.5, planning TOEFL

French
Elementary Proficiency

Persian
Native

References available upon request.