Amir Esmaeili

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Research Experience

Brain Tumor Detection in MRI Images **March 2025 - Present**

↪ **Supervisor: Dr. Farnaz Mahan at University of Tabriz**

- Conducting research on Vision Transformers plus Transfer Learning for brain tumor detection in MRI images.
- Optimizing and evaluating the models to achieve higher accuracy and reliability in results.

Model Merging in LLMs and Pre-trained Models **May 2024 - Present**

↪ **Supervisor: Prof. Mehrdad Mahdavi at Penn State University (remote)**

- Literature review of Model Merging approaches for LLMs and Pretrained Models
- Implementing and benchmarking state-of-the-art model merging methods (e.g., Uncertainty-Based Gradient Matching, Fisher-Weighted Averaging) to combine LLMs with minimal performance loss.

Research Interests

- Machine Learning and Deep Learning
- Transfer Learning and Fine-Tuning Techniques in LLMs
- Transformer Architectures and Attention Mechanisms
- Computer Vision and Medical Image Analysis

Education

B.Sc. Computer Science *University of Tabriz* **2019 – 2023**

- Full Scholarship Recipient
- Ranked 4th in Overall B.Sc. GPA
- Honorable Mention in The International Collegiate Programming Contest - 2019, 2020, 2021
- Top 3% in National University Entrance Exam
- Selected Specialized Course Grades: Advanced Programming: A+, Data Structures: A+, Probability: A+, Discrete Mathematics: A+, Linear Algebra: A, Algorithms: A+, Theory of Computation: A+, Compiler: A+

High School Diploma *National Organization for Development of Exceptional Talents (Sampad)* **2014 – 2018**

Publications

- *Blockchain*, Published in *In the neighborhood of Mathematics* (Faculty of Mathematics, Statistics and Computer Science), First Print Edition, March, 2025. Adapted from a presentation on Blockchain and Mathematics.

Projects

Resume Matching System *Personal Project* **07/2025 – Present**

- Designed an AI-powered matching system leveraging text embeddings to align candidate profiles with job descriptions; a framework transferable to marketing personalization (e.g., matching customer profiles with product/service offerings).
- Designing and implementing the backend using Django and PostgreSQL with pgvector for vector similarity search.
- Integrating Hugging Face models for text embedding and OpenAI for job description enhancement via chatbot.
- Architecting modular APIs and background job processing using Celery and Redis.
- Emphasizing scalable deployment with Docker and secure API access.
- **Skills:** Python, Django, pgvector, Hugging Face Transformers, OpenAI API, Celery, Redis, Docker, Local LLM

Question Generating App *Freelance Project* **07/2025 – 08/2025**

- Developed a prompt-engineered question generation platform using OpenAI, Gemini, and DeepSeek APIs tailored for educational institutes.
- Enabled teachers to upload resources (PDFs, text, images) for automatic exam question generation across cognitive levels and subject domains.
- Supported rich outputs including diagrams, LaTeX equations, and images using multimodal API capabilities.
- Designed RESTful APIs and handled file preprocessing, metadata extraction, and custom prompt templates for accuracy.
- Emphasized modular pipeline structure with logging, error handling, and scalability for concurrent users.
- **Skills:** Python, OpenAI API, Gemini API, DeepSeek API, Prompt Engineering, REST APIs, File Handling

Insurance Recommender System *Freelance Project* **03/2025 – 05/2025**

- Developed a recommender system analyzing customer purchase history and behavioral patterns to predict insurance preferences; directly supporting customer segmentation and personalized product recommendations similar to marketing campaign targeting.
- Designed a hybrid recommender system combining collaborative filtering and content-based filtering approaches.
- Analyzed customer demographics, purchase history, and behavioral interactions to identify cross-sell opportunities and predict customer lifetime value (CLV) - directly aligned with marketing analytics practices.
- Deployed a real-time insurance recommendation engine via REST APIs, driving personalized product offers and improving conversion potential.
- Conducted testing simulations and evaluated metrics to tune the recommendation quality.
- **Skills:** Python, Scikit-learn, Pandas, Recommender Systems, Feature Engineering, REST APIs, Testing

AI-Powered Itinerary Generator *Personal Project* **08/2025**

- Developed a serverless application that generates detailed travel itineraries using the OpenAI GPT-4o model.
- Architected an asynchronous backend using Cloudflare Workers that immediately returns a job ID and processes requests in the background.
- Implemented a SvelteKit frontend to provide real-time status updates by listening to a Google Firestore database.
- Ensured data integrity through schema validation with Zod and robust data parsing.
- **Skills:** Cloudflare Workers, SvelteKit, Google Firestore, OpenAI API, Zod, Node.js

Educational Chatbot *Personal Project* **05/2025**

- Built a backend service to answer educational questions based on provided content using natural language processing.
- Implemented a three-step process of content embedding, retrieval, and answer generation.
- Utilized a multilingual sentence transformer model for creating vector embeddings of the educational content.
- Deployed the application using Docker for portability and scalability.
- **Skills:** Python, FastAPI, Transformers, Docker

Qualifications

Programming	Python, C++, PHP
Machine Learning & AI	Deep Learning, Transfer Learning, Transformer Models, Reinforcement Learning
Image Processing	OpenCV, TensorFlow, PyTorch, Keras
NLP/LLM Tools	LangChain, OpenAI API, HuggingFace Transformers
Frameworks & DB	Django, Laravel, MySQL, PostgreSQL
Software Development	Version control, Agile methodologies, Software design patterns, API development, Docker, RESTful APIs, Webhooks, Linux
Languages	English – IELTS: 7, Persian, Turkish, Azarbaijani
Soft Skills	Problem-solving, Critical thinking, Research methodology, Scientific writing, Teamwork and collaboration, Project management

Work Experience

ML Engineer/ Data Scientist *Desmer Guvenlik* **02/2024 – Present**

- Built and deployed AI optimization models for logistics, improving operational efficiency and reducing service delays; enabling cost savings and improved customer satisfaction.
- Applied causal inference techniques to evaluate the impact of business process changes, contributing to reduction in service delays.
- Integrated ML models into live systems, enhancing real-time decision-making and reducing manual oversight.
- Conducted demand forecasting on ATM cash withdrawals during seasonal/holiday periods, identifying behavioral patterns that optimized resource allocation; analogous to predicting campaign performance and customer spending in marketing.
- **Skills:** Python, Scikit-learn, Pandas, SQL, Django, ML Algorithms

Backend Developer *Aral Studio* **02/2023 – 01/2024**

- Designed and optimized backend systems capable of handling high user traffic in real time, ensuring excellent uptime and system reliability under peak loads.
- Improved API response time through codebase refactoring and database indexing.
- Collaborated with cross-functional teams to implement microservices, ensuring scalability and ease of deployment.
- **Skills:** PHP, MySql, Laravel, Wordpress, Html, JavaScript

Backend Developer *NOAY* **09/2021 – 01/2023**

- Built secure and scalable backend infrastructure for a cryptocurrency platform, supporting high-frequency transactions with near-zero failure rates.
- Developed robust APIs and microservices that reduced server load by 25% and improved overall system responsiveness.
- Partnered with frontend teams to ensure seamless integration and intuitive user experience, increasing user satisfaction scores.
- **Skills:** PHP, MySql, Laravel, Wordpress, Html, JavaScript

References

Prof. Mehrdad Mahdavi
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