Hossein Rahmani

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Education

- **University of British Columbia** — Vancouver, Canada
  Master's degree in Mathematics GPA: 4.0/4.0 (12 credits) — *Sep 2023 – 2025 (Expected)*
  Member of the **Institue of Applied Mathematics of UBC (IAM)**

  Relevant Courses:

  Advanced Machine Learning - Computational Optimization

- **Sharif University of Technology** — Tehran, Iran
  Bachelor's degree in Computer Science GPA: 4.0/4.0 (141 credits) — *2019 – 2023*
  Relevant Courses:

  Advanced Programming in Java (OOP) 20/20 - Probability & Applications 19.8/20 - Statistics & Applications 19.8/20 - Numerical Analysis 20/20 - Regression Analysis (Statistical Learning) 20/20 - Information Theory 20/20 - Algorithms Analysis 19.4/20 - Stochastic Processes 19.1/20 - Financial Mathematics 16.5/20

Projects

- **Bitcoin Question-Answering RAG**: A Retrieval Augmented Generation (RAG) system for answering questions from Bitcoin articles by using **Chroma** Vector Database (Sentence Transformer as an embedding) and **Langchain** and **OpenAI** client GPT4 as a factual agent plus a **Tavily LLM Search** agent to answer questions from web
- **Spam Detection**: Spam detection task by **Tree-based** Methods (**Decision Tree**, **Bagging**, **Random Forest**, **Ada Boost**, **XGBoost**) and their solutions comparison on spam dataset.
- **Recommendation System**: Developed a Recommendation System for foods using the **ALS** (Alternative Least Squares) method for matrix factorization part implemented in **Julia** (programming language).
- **HearthStone**: Implemented Graphical Client-Server HearthStone game as final project for Advanced Programming course. I used multiple design patterns(**Solid principles, Factory** and **Visitor** design patterns.)

Work Experience

- **Data Scientist & Intern** — Tehran, Iran
  *at Shomara under the supervision of **Prof. Mir-Omid Haji-Mirsadeghi*** — *Dec 2021 - Oct 2022*
  - **Internship**: Worked on prediction of purchase surplus and **Heterogeneous Treatment Effects** when people got credit using Causality methods like **GRF** with a novel type of experiment.
  - **Data Scientist**: Continued to work on the mentioned project by developing a way to estimate the probability of defaulting (in case people won't pay off money) in **high variance setting** using **XGBoost** and reduced the variance by **CUPED** method.

- **Junior Data Scientist** — Tehran, Iran
  at Snapp Market — *Sep 2021 - Dec 2021*
  - Implemented tracking and feature extraction of Computer Vision project about tracking staff and finding a map of the market using **YOLO Algorithm**, **Open CV**, and **Scikit-learn**.
  - Built Weekly dashboard for showing marketing statistics from Snapp's database using **SQL**.

- **Data Science Internship** — Tehran, Iran
  at Zarrin Roya — *Aug 2021 - Nov 2021*
  - Used Regression Algorithms for analyzing trends in business and did statistical tests for Trend detection based on the Mann-Kendall score.
  - Implemented customer segmentation with **GMM, Spectral Clustering**) in **Python** with acceptable high accuracy.

Research Experience

- **University of British Columbia** Vancouver, Canada
  *Research Assistant Under the Supervision of **Prof. Elina Robeva*** *Sep 2023 - Present*
  - Working on my master's research focused on discovering Gene Regulatory Networks by identifying causal relationships between genes over time by developing novel **Causal Discovery** methodologies for time series data and **Optimal Transport** to elucidate the temporal dynamics of these biological networks.

- **Data Science & Machine Learning Lab of Sharif University of Technology (DML)** Tehran, Iran
  *Research Assistant Under the Supervision of **Prof. Hamid R. Rabiee*** *Jul 2022 - Jan 2023*
  - Worked on the **Motion Generation** part of **Target Domain Augmention** in human videos project to create diverse motions by using a **Normalization Flow** technique called MoGlow for human motion synthesis and add context from target domain in our pipeline to create videos.

- **Sharif University of Technology** Tehran, Iran
  *Research Assistant Under the Supervision of **Prof. Mojtaba Tefagh*** *Jun 2022 - Oct 2022*
  - Worked on the bachelor's project about the intersection of Deep Learning and Optimization specifically **Implicit Bias** of deep learning optimization algorithms like **Gradient Descent** and **Generalization** of these algorithms, with reasons for optimization efficiency and generalization of SGD.

- **Sharif Optimization and Applications Laboratory (SOAL)** Tehran, Iran
  Research Assistant *Jan 2022 - Jun 2022*
  - **Manifold Sampling**: Implemented Manifold Sampling' Algorithm **SUGAR** for data generation for OPTIMIZER competition held by SOAL laboratory in Multi-Manifold Clustering
  - **Multi Manifold Clustering**: Developed a benchmark for multi-manifold clustering consisting of different algorithms like **Hierarchical-Clustering**, **Spectral-Clustering**, **K-means**, **GMM**, density-based algorithms,...
  - **Dimension Reduction**: Implemented **PCA** and **T-SNE** for dimension reduction and visualization technique for comparing clustering solutions on the data).

Programming Skills

- **Programming Languages & Tools**: Java, Python, Julia, SQL, GIT, R
- **Machine Learning Tools**: PyTorch, Langchain, TensorFlow, NumPy, Scipy, Pandas, Scikit-learn, OpenCV

Language Skills

- **Persian**: native **English**: proficient **French**: B1 (Delf A2 result: 86/100)

Honours and Awards

- **Silver Medal in the National Iranian Mathematical Olympiad**
  Young Scholar Club *Jun 2018*
  An Iranian innovative problem-solving contest that covers 4 major fields (Euclidean Geometry, Combinatorics, Number Theory, and Algebra) like IMO.