Hossein Rahmani

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Summary

Mathematics master's student at UBC leveraging ***research*** and ***industry*** experience in ***Machine Learning, Causal Inference***, and ***Large Language Models***. Complemented by a Bachelor's in Computer Science at Sharif University of Technology. Demonstrated capability in implementing complex algorithms using ***Python***, Java, and ***SQL***, while architecting solutions with industry-standard ML frameworks including ***PyTorch*** and TensorFlow. Proven track record of deploying production-level applications using ***AWS (EC2, S3, Lambda, Glue, Athena)***, ***Spark***, ***Hadoop***, and Git, coupled with advanced proficiency in data analysis tools like ***Pandas*** and ***Scikit-learn***.

Education

- **University of British Columbia** — Vancouver, Canada
  *Master's in Applied Mathematics, 12 credits (**GPA: 4.0/4.0**)* — *September 2023 – August 2025 (Expected)*

  Relevant Courses: Advanced Machine Learning (A^+) - Causal Inference & Graphical models (A^+) - Causal Machine Learning (A) - Computational Optimization (A)

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

  Relevant Courses: Advanced Programming in Java (OOP) 20/20 - Probability & Applications 19.8/20 - Regression Analysis (Statistical Learning) 20/20 - Algorithms Analysis 19.4/20

Selected Research & Work Experience

- **Semester Research project**
  *at UBC under the supervision of **Prof. Mathias Lécuyer*** — *September 2024 - Present*
  - Designed an algorithm to measure the **attribution of prompt words** on the **Large Language Model**'s output by conducting a **Randomized Experiment** to estimate the Average Marginal effect (AME) of adding a word to the prompt.

- **Research Assistant**
  *at UBC under the Supervision of **Prof. Elina Robeva*** — *September 2023 - Present*
  - Designed an iterative algorithm using **Optimal Transport** to jointly estimate the drift, diffusion, and causal graph associated with a Stochastic Differential Equation from temporal marginals for the first time. This work is part of master's research, and the Preprint is available on Arxiv.

- **Data Scientist & Intern**
  *at Shomara under the supervision of **Prof. Mir-Omid Haji-Mirsadeghi*** — *December 2021 - October 2022*
  - **Internship**: Predicted the purchase surplus when people got credit using Conditional Average Treatment Effect estimator **GRF** with a novel type of experiment for finding this **Heterogeneous Treatment Effect**.
  - **Data Scientist**: Developed a method to decrease variance for estimating the probability of defaulting (in case people don't pay off money) in **high variance setting** by **CUPED** method and using **XGBoost** lead to 5 % increase in prediction accuracy.

- **Data Science Internship**
  at Snapp Market — *September 2021 - December 2021*
  - Created an innovative algorithm that improved the precision of staff location tracking accuracy by 20% through feature extraction and the **YOLO Algorithm**, and tools in **Open CV**.
  - Built weekly dashboard for showing marketing statistics from Snapp's database using **SQL**.

Selected Projects

- **Bitcoin Question-Answering RAG**: Engineered an RAG framework for answering questions related to Bitcoin by using Sentence Transformer embeddings in **Chroma** vector Database; integrated **OpenAI's GPT-4** and **Tavily** LLM Search agent for searching tool for enhanced response accuracy.
- **Manifold Sampling & Multi-Manifold Clustering**: Implemented a **multi-manifold clustering** benchmark using **SUGAR** sampling algorithm for OPTIMIZER competition with more than 30 teams at the Sharif University of Technology.
- **HearthStone**: Implemented Graphical Client-Server HearthStone game employing **Solid principles, Factory** and **Visitor** design patterns for handling different actions of a card in the game neatly.

Honours and Awards

- **BPOC Graduate Excellence Award**
  Mathematics Faculty of University of British Columbia *August 2024*
  Awarded for outstanding achievements among master's students of color in the Mathematics Faculty.
- **Silver Medal in National Mathematical Olympiad**
  Young Scholar Club *June 2018*
  Iranian National Mathematical Olympiad is an innovative competitive math contest that covers 4 major fields (Euclidean Geometry, Combinatorics, Number Theory, and Algebra) like IMO but on a national scale.