Mahtab Raeis-Danaei

mraei@uic.edu | Webpage | GitHub | LinkedIn

Optimization & Decision Science Expert Advancing Language Models for Risk-Aware Decision Making

RESEARCH FOCUS

- Create high-fidelity natural language simulators for problems in which users exhibit heterogeneous reasoning and decisions, and where standard algebraic optimization formulations are unsuitable.
- Leverage language models (LMs) to provide both decision and reasoning distributions, where reasoning is used to assess the plausibility of decisions.
- Investigate whether semantic grounding of LM reasoning in normative frameworks of human decision making leads to more realistic decision distributions, and explore its impact on (i) decision prediction, (ii) reasoning quality under compression (i.e., quantization), and (iii) stability and robustness under perturbations.
- Apply group level response modeling to organizational policy making, such as incentive design, to enable more effective and efficient policy design.

EDUCATION

University of Illinois Chicago (UIC) *Aug 2024–Present*
Second Year PhD in Information & Decision Sciences (Business Administration)
Advisor: Prof. Selva Nadarajah, Associate Professor

Amirkabir University of Technology (AUT) *Sep 2020–May 2024*
B.Sc. in Industrial Engineering
GPA: 3.87 / 4.00
Bachelor Thesis: *Prediction of Cardiovascular Diseases Using Machine Learning Algorithms*

WORKING PAPERS

- **Modeling How People Think: Structured Deliberation to Improve Language Model Simulations of Human Decision Making**. In progress (with Daniel R. Jiang; Selva Nadarajah)
- **What Companies Say vs. What Matters: LLM Analysis of Biodiversity Disclosures in Oil and Gas**. Pre-print on EarthArxiv
  (with Satender Gunwal; Selva Nadarajah)

WORK IN PROGRESS

- **Local Decision Simulation with Quantized LLMs**.
  (with Abhilash Chenreddy; Selva Nadarajah)

CONFERENCES & PRESENTATIONS

Modeling How People Think: Structured Deliberation to Improve Language Model Simulations of Human Decision Making. Presented at INFORMS Annual Meeting, Atlanta, *2025*

Corporate Nature & Biodiversity Reporting in CDP Disclosures: A Large Language Model Study. Presented at BNEAT Conference, Indiana, *Summer 2025*

RESEARCH PROJECTS

- **Prediction of Cardiovascular Diseases Using Machine Learning Algorithms** *2024*
  Bachelor's Thesis
- **Reinforcement Learning Control of Ambient Temperature in a Virtual Environment** *2022–2023*
  Course Project, Algorithm Design Foundations
- **Movie Recommendation System** *2022–2023*
  Course Project, Artificial Intelligence
- **Process Modeling, Database Design, and Management Dashboard for a Hospital** *2023–2024*
  Course Project, Management Information Systems

TEACHING EXPERIENCE AND INTERNSHIPS

Teaching Assistant, University of Illinois Chicago (UIC) *2024–2025*
Operations Management (Microsoft Excel Skills)

Teaching Assistant, Amirkabir University of Technology (AUT) *2022–2024*
Machine Learning
Manufacturing Processes
Motion & Time Study

Research Assistant, UIC Energy Resources Center *Summer 2025*

Intern, Bahman Motor (Private Car Manufacturing Company), Iran *Summer 2022*

HONORS & AWARDS

Graduate Fellowship / Scholarship, University of Illinois Chicago *2024–Present*

Merit-Based Admission to M.Sc. Program, AUT *2023*

Top 1% among 150,000 participants, National University Entrance Exam (Iran) *2020*

TECHNICAL SKILLS

- **Programming:** Python, LLM evaluation pipelines
- **Machine Learning:** Deep learning, reinforcement learning, large language models, model quantization
- **Optimization and Decision Models:** Mathematical programming, Markov decision processes
- **Tools and Platforms:** PyTorch, Hugging Face, Ollama, cloud computing, computing clusters