Pooyan Shirvani Ghomi, Ph.D.,

Last update : May 15, 2025

CONTACT INFORMATION

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SUMMARY

Accomplished Operations Research Scientist with diverse background in Machine Learning and AI, specializing in mathematical optimization and applied mathematics. Expertise focuses on developing data-driven models to solve complex business challenges. Proven track record of improving organizational performance through advanced optimization techniques, machine learning algorithms, and AI technologies to generate actionable insights and optimize strategic decision-making processes.

KEY SKILLS

Data-Driven Decision Making, Problem Solving, Innovation Applied Research, Business Analysis, Project Management, Technical Leadership, Cross-Functional Collaboration, Client-Focused Solution Design, Mentorship Team Development, Analytical Thinking, Communication of Complex Ideas

TECHNICAL KNOWLEDGE

- **Matheamtical Optimization**: Convex Optimization, Mixed Integer Optimization, Operations Research.
- **Machine Learning**: Regression, SVM, Decision Trees, GBM, Clustering, Dimensionality Reduction, Deep Learning, Graph Analytics.
- **Optimization Solvers**: Gurobi, CPLEX, AMPL, CVXPY, CVXOPT.
- **Generative AI**: LLM, Retrieval-Augmented Generation (RAG), Agentic Workflows, Prompt Engineering, and Chunking Strategy Optimization.
- **Numerical Analysis and Algorithm Development.**
- **Programming Skills**: Python, SQL, Familiar with C++ and Rust.
- **Data Visualization**: Panel, Dash, Bokeh, Matplotlib, hvPlot, etc.
- **Cloud Technology and CI/CD**: Version Control (Git), AWS, Azure, Docker, etc.

INTERPERSONAL SKILLS

- **People Management**: supervising junior data scientists in ETL pipelines, features generation, models development, and personal growth.
- Effectively collaborates in cross-functional teams while also excelling in independent work.
- Out of box thinker and problem solver.

PROFESSIONAL EXPERIENCE

Senior Machine Learning Engineer - September 2023 - March 2025
Autodesk Inc, Toronto, Ontario, Canada
Projects:

- Prescriptive Analytics Solution for Operations Management:
  - Designed and developed a **modular mathematical modeling engine to support optimization-based** decision-making in operations management.
  - Implemented advanced **Mixed Integer Programming (MIP)** formulations with **supply-chain management** principles to create configurable optimization solutions.
  - Engineered sensitivity analysis capabilities allowing users to evaluate multiple operational scenarios through systematic parameter variation.
  - Developed a flexible constraint programming interface enabling customized objective functions and parameter definitions for tailored optimization studies.
  - Created an intuitive interface allowing Subject Matter Experts to leverage sophisticated mathematical programming models without requiring optimization expertise, significantly enhancing operational efficiency.
- Simulation Co-Pilot POC
  - Developed a Proof of Concept for a Simulation Co-Pilot leveraging AI agentic workflows to analyze simulation logs, configuration files, and external knowledge bases, aiding users in troubleshooting simulations.
  - Collaborating closely with Subject Matter Experts (SMEs) and developers in a cross-functional team to thoroughly understand simulation issues and create AI agents capable of providing in-

sightful, actionable recommendations.
  - Building structured data pipelines by converting semi-structured simulation logs and configurations into structured formats to enhance analysis capabilities and integration with AI tools.
  - Researched state-of-the-art methods to leverage Agentic AI workflows for identifying simulation errors, determining their root causes, and suggesting targeted configuration adjustments to simplify troubleshooting.
- AI Auditor
  - Built using LLM and RAG to enable engineers to validate design parameters against regulatory standards, improving efficiency and accuracy, reducing manual checks, and minimizing compliance risks.
  - Optimized the ingestion of user-provided documents (PDFs, URLs, files) by implementing a hierarchical chunking strategy to preserve context and ensure related information, such as tables, remains within the same chunk.
  - Applied an agentic workflow to optimize queries and leveraged reranking models to prioritize the most relevant information, improving the quality of extracted design parameters.
  - Designed and implemented automated unit tests to assess the performance and accuracy of the AI Auditor pipeline.
- FlowGPT:
  - Improved user experience by integrating an LLM-powered chatbot to provide easy access to help and necessary materials for task completion.
  - Implemented guardrails to ensure the chatbot's responses remained truthful and relevant, and to prevent jailbreak attempts.
  - Developed a query transformer that incorporated user interaction history and generated responses to ensure seamless conversations.

Senior Data Scientist - March 2021 - September 2023
OMERS, Toronto, Ontario, Canada
Projects:
- FX Hedging - Total Portfolio Management (TPM)
  - Partnered with the TPM team to scope project requirements, define data needs, and align on project goals.
  - Developed and implemented a **mathematical programming** solution using the **Mean-Variance optimization model** for FX hedging strategy.
  - Reduced FX exposure and hedging costs through statistical analysis of historical data and optimization techniques.
  - Created a web application incorporating scenario analysis algorithms that enable portfolio managers to evaluate total return under various market conditions.
- Trade area analysis
  - Formulated and solved a **p-median mathematical programming** model to determine optimal service point locations through **discrete optimization (MIP)**.
  - Applied probabilistic record linkage techniques through an unsupervised machine learning framework for entity resolution and deduplication.
  - Developed a comprehensive PowerBI dashboard to visualize optimization results and facilitate data-driven decision making.
- insightFlow
  - Designed and constructed a data platform utilizing Databricks, Prefect, and Azure cloud services.
  - offers a range of capabilities, including scheduling, automatic task execution, and comprehensive logging.
- Graph analytic
  - Applied deep learning for low-dimensional graph node representations.
  - Developed node classification and recommendation systems for graph analysis.
  - Created a visualization tool using Dash-Cytoscape for exploring graphs and networks.

Data Scientist - November 2018 - March 2021
Manulife, Toronto, Ontario, Canada
Projects:
- Partial withdrawal rate prediction of retirement saving accounts.
- Identifying suspicious withdrawal transactions.
- Sponsor Churn Prediction.

Senior Market Risk Analyst - September 2016 - November 2018
TD Securities, Toronto, Ontario, Canada
Projects:

- Market Risk Evaluation Services API.
- Credit Transition Matrix Estimation leveraging Mathematical Optimization.

Education

Ph.D. in Mathematics and Statistics
University of Calgary
Calgary, Alberta, Canada
Sept 2010 – Sept 2015
Dissertation: p-Cone Optimization with Application to Radiotherapy Planning
Awards: Dean's Entrance Scholarship, University of Calgary, September 2010

Master and Bachelor of Science in Applied Mathematics.

Awards

- SparkAward - Third Quarter 2019, Manulife, November 2019
- Personal Information Identification, Manulife internal competition, second place team, September 2019

Publication

list of publications is available upon request.