Email: faraz.khoshbakhtian@mail.utoronto.ca
Cell: 647-702-0238
Toronto, Ontario
LinkedIn | Personal website

Faraz Khoshbakhtian

EDUCATION

Ph.D., Industrial engineering, University of Toronto, Expected defense in 2025 (Current GPA: 4.0)
Thesis: Graph representation learning for a generalized and scalable solutions to the critical node detection problem, with applications to pandemic vaccination strategies
Supervisor: Dionne M. Aleman, Ph.D.

H.B.Sc., University of Toronto, 2020 (Cumulative GPA 3.7)
Concentrations: Computer Science, Statistics, and Philosophy

Areas of expertise

Graph learning; graph neural networks; reinforcement learning; deep neural networks and training dynamics; distributed computing and big data analysis; operations research; combinatorial optimization; analysis and interpretability for machine learning; recommendation engines; test-driven development.

Professional experience

- **Applied science intern, Amazon, Summer 2024**
  Network representation learning R&D for optimizing Amazon Air's transportation networks.
- **Applied science intern, Mastercard, 2023-2024**
  A Mitacs Accelerate project; developing state-of-the-art network representation learning algorithms for universal node embeddings. Project focused on development of novel self-supervised and reinforcement learning algorithms for generalized learning on graphs.
- **Data scientist and software developer, Ctrl Designer, 2017-Present**
  Applied machine learning techniques such as reinforcement learning in software development to optimize and automate industrial processes.
- **Data scientist, RBC, Summer 2021**
  Designed, implemented, and validated climate analytics tools using interpretable machine learning and statistics. Extensively used Hadoop and Spark to handle big data, train models, and interpret them.
- **Developer and curriculum writer, Code at the Edge, 2018-2019**
- **Department assistant, Department of Philosophy, University of Toronto, Summer 2018**
- **Research assistant, Scholars in Residence, University of Toronto, Summer 2017**
  Intensive research project on China's cultural revolution and its effects on the marginalized population supervised by Dr. Yiching Wu.

Technical skills

Python, mojo 🔥, Java, C++, Julia; large-scale agent-based simulation modelling; AWS; SageMaker; PyG and DGL; PyTorch and TensorFlow; GitHub Actions; Weights & Biases; MLflow; LangChain; Graph neural networks; Transformer architecture; Gurobi; database management systems; computer science and machine learning theory; neural network applications and interpretability; statistical learning; cloud computing; distributed computing.

Publications

Published (or accepted for publication)

[1] Khoshbakhtian, F., Validi, H., Ventresca, M., Aleman, D. M. Distance-based critical node detection for effective vaccine policies. *accepted for publication at Operations Research Letters.* 2024.
[2] Khoshbakhtian, F., Gaurav, O., Aleman, A., and Asthana, S. MEGA: Multi-Encoder GNN Architecture for stronger task collaboration and generalization. *accepted for publication at Lecture Notes in Computer Science Series (LNCS)*. 2024.
[3] Khan, S. S., Khoshbakhtian, F., and Ashraf, A. B. Anomaly detection approach to identify early cases in a pandemic using chest X-rays. *Proceedings of the Canadian Conference on Artificial Intelligence*. 2021. doi: 10.21428/594757db.fab

In-progress

[4] Khoshbakhtian, F., Ahamd, A., Cohen, A., and Aleman, D. M. Enhancing critical node detection with beam search: a heuristic-agnostic approach*. targeted for INFORMS Journal on Computing.*
[5] Khoshbakhtian, F., Lagman, A., Aleman, D. M., Giffen, R., and Rahman, P. Prediction of severe COVID-19 infection at the time of testing: A machine learning approach. *targeted for Canadian Medical Association Journal.*
[6] Navabzadeh, F., Khoshbakhtian, F., Aleman, D. M., Giffen, R., and Rahman, P. Machine learning to predict clinical outcomes of psoriasis patients. *targeted for Canadian Medical Association Journal.*

Pre-prints

[1] Khoshbakhtian, F., Lagman, A., Aleman, D. M., Giffen, R., and Rahman, P. (2021). Prediction of severe COVID-19 infection at the time of testing: A machine learning approach. medRxiv. doi: 10.1101/2021.10.15.21264970v1.

Conference and workshop presentations

(**bold** for the presenter)
[1] **Khoshbakhtian, F.**, Ahamd, A., Cohen, A., and Aleman, D. M. Enhancing critical node detection with beam search: a heuristic-agnostic approach*.* INFORMS Annual Meeting. Seattle, US. October 2024 (*scheduled*).
[2] **Khoshbakhtian, F.**, Gaurav, O., Aleman, A., and Asthana, S. MEGA: Multi-Encoder GNN Architecture for stronger task collaboration and generalization. ECML PKDD. Vilnius Lithuania, September 2024 (*scheduled*).
[3] **Khoshbakhtian, F.**, Ahamd, A., Cohen, A., and Aleman, D. M. Enhancing critical node detection with beam search: a heuristic-agnostic approach*.* CORS Annual Meeting. London, Canada. June 2024.
[4] **Khoshbakhtian, F.**, Validi, H., Ventresca, M., Aleman, D. M. Distance-based critical node detection for effective vaccine policies. INFORMS Annual Meeting. Phoenix, US. October 2023 (*scheduled*).
[5] **Khoshbakhtian, F.**, Validi, H., Ventresca, M., Aleman, D. M. Distance-based critical node detection for effective vaccine policies. INFORMS Healthcare. Toronto, Canada. July 2023.
[6] **Khoshbakhtian, F.**, Validi, H., Ventresca, M., Aleman, D. M. Distance-based critical node detection for effective vaccine policies. CORS / Optimization Days. Montreal, Canada. May 2023.
[7] Khoshbakhtian, F., Validi, H., Ventresca, M., **Aleman, D. M.** Distance-based critical node detection for effective vaccine policies. Panoptic: view on global optimization. Florida, US. March 2023.
[8] **Khoshbakhtian, F.**, Lagman, A., Aleman, D. M., Giffen, R., and Rahman, P. Prediction of severe COVID-19 infection at the time of testing: A machine learning approach. *CORS/INFORMS International Conference*. Vancouver, Canada. June 2022.

[9] **Pirmorad, E.**, Khoshbakhtian, F., Mansouri, F., and Farahmand, A. M. Deep reinforcement learning for online control of stochastic partial differential equations. Spotlight presentation at *The Symbiosis of Deep Learning and Differential Equations*. virtual. Dec 2021.

[10] **Khoshbaktian, F.** Machine learning for early detection of severe COVID infection. *University of Toronto Engineering Research Conference (UTERC)*. virtual, Canada. July 2021.

[11] **Navabzadeh, F.**, Khoshbakhtian, F., Aleman, D. M., Giffen, R., and Rahman, P. Machine learning to predict clinical outcomes of psoriasis patients (*invited presentation*). INFORMS Healthcare Conference. virtual, Canada. July 2021

Teaching experience

- **Head teaching assistant, University of Toronto, 2018-present**
  - Courses: Big Data Science (MIE1628); Data Modelling (MIE253); Fundamentals of Object-Oriented Programming (MIE250); Fundamentals of Computer Programming (APS106); Introduction to Philosophy (PHL101)
  - Responsibilities: Managing teams of TAs, preparing tutorial material, holding office hours, designing and marking assignments and exams.

Leadership and service

- **Co-Founder, Executive Member,** University of Toronto Students for a Free Iran, 2022-Present
- **Co-Director, Marketing Team**, ILead:Grad, University of Toronto Faculty of Applied Science & Engineering, 2020-2021
- **Co-Lead, Design Team**, Cyrus International Film Festival of Toronto, 2016-2018
- **Workshop Facilitator, Research Officer**, InDepth Conference at the Munk School of Global Affairs, 2016-2017

Awards

- MITACS Accelerate award (toward applied science internship at Mastercard) (17,500) (2024)
- Ontario graduate scholarship (OGS) (15,000) (2023-2024)
- MITACS Accelerate award (toward applied science internship at Mastercard) (15,000) (2023)
- Emerging and Pandemic Infections Consortium (EPIC) doctoral award ($10,000) (2023)
- 6T6 Industrial Engineering 50th Anniversary Award in Healthcare Engineering ($3,000) (2022)
- Faculty of Applied Science & Engineering Graduate Student Endowment Award ($3,000) (2020)
- Woodsworth College Brookfield's Leadership Scholarship ($6,000) (2018)
- Jackman Humanities Scholars in Residence Scholarship ($1,500) (2017)
- Sam & Mary Restivo Family Admission Scholarship ($1,200) (2015)