Parshan Pakiman

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OVERVIEW

I am a Ph.D. candidate in Information and Decision Sciences at the University of Illinois at Chicago and work towards developing off-the-shelf Reinforcement Learning (RL) algorithms for Operations and Finance applications. My Ph.D. research advances RL methodologies that (i) guarantee near-optimal solutions and (ii) facilitate implementation. I employ AI, optimization, machine learning, and high-dimensional sampling techniques to develop convergent algorithms that reduce hyper-parameter tuning, mitigate heuristic design of approximation architectures, and ease selecting a plausible model of data. My research broadens the applicability of RL since both the above properties allow RL algorithms to"self-adapt" to different applications, datasets, and problem instances without requiring significant hand-engendering. I assess the performance of these RL methods on synthetic and real-world data by running high-dimensional simulations and solving large-scale optimizations models using state-of-the-art platforms such as Gurobi, CVXPY, Pyomo, SimPy, PyMC, Tensorflow, and Gym.

EDUCATION

University of Illinois at Chicago (UIC), Chicago, IL — Spring 2017 - (Expected) Fall 2022

Ph.D. in: Information and Decision Sciences

Thesis title: *Mitigating Model Risk in Reinforcement Learning: Self-adapting Methods with Applications in Operations and Finance*

Co-advisors: Professors Selva Nadarajah and Negar Soheili

University of Illinois at Chicago, Chicago, IL — Spring 2017 - (Expected) Fall 2022

M.Sc. in: Business Analytics

University of Tehran, Tehran, Iran — Fall 2012 - Fall 2016

B.Sc. in: Applied Mathematics

WORK EXPERIENCES

- Worked in the Advanced Solutions team at Guidehouse (**Link**) as a research intern on a simulation-based RL algorithm for an offline workflow scheduling/planning problem (a related conference paper in preparation). — Fall 2021
- Collaborated with a major e-commerce company to design an AI system that learns the behavior of packaging workers from their decision data and uses their behavior to balance the company's financial and social objectives. — Spring 2021
- Worked with Foresight ROI to design a framework for mining past marketing data and for optimizing future marketing campaigns (**Link** to the resulting paper published in *KDD 2019*). — Fall 2017 - Summer 2019
- Collaborator on a multi-university and industry initiative to develop an open-source reinforcement learning and approximate dynamic programming platform for operations and finance applications. — Fall 2019
- Teaching experience in graduate classes with Business Data Mining, Statistical Learning, Intro to Machine Learning, and Intro to Operations Management. — Since Fall 2017

RESEARCH INTERESTS

- Working towards off-the-shelf RL algorithms that sidestep hyper-parameter tuning and heuristic hand-engineering, making RL accessible to users without domain-knowledge.
- Tackling real-world problems at the interface of finance and operations such as financial options pricing, dynamic pricing with demand learning, marketing campaign optimization, inventory management using AI, machine learning, stochastic simulation, and optimization methodologies.
- Modeling sequences of decisions made by a rational agent using inverse reinforcement learning (IRL) and online convex optimization and using fitted models in higher-level optimizations.

AWARDS AND HONORS

BGS[1] membership:	College of Business, University of Illinois at Chicago	Since Spring 2021
Doctoral fellowship:	Department of Information and Decision Sciences, University of Illinois at Chicago	Since Spring 2017
Best student scholarship:	Department of Mathematics, Statistics and Computer Science, University of Tehran	Fall 2016
Technical qualification:	RoboCup Iran open, soccer 2D simulation league	Fall 2016
Technical qualification:	Khwarizmi international award, soccer 2D simulation league	Fall 2010

PUBLICATIONS

Journal Papers

- B. Chen, S. Nadarajah, P. Pakiman, S. Jasin. *Self-adapting Robustness in Demand Learning* (**Link**). Under revision for resubmission to **Operations Research**.
- P. Pakiman, S. Nadarajah, N. Soheili, Q. Lin. *Self-guided Approximate Linear Programs* (**Link**). Under second round review at **Management Science**.

Conference Papers

- A. Chenreddy, P. Pakiman, S. Nadarajah, R. Chandrasekaran, R. Abens. *SMOILE: A Shopper Marketing Optimization and Inverse Learning Engine* (**Link**). **Proceedings of the 25th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining**, 2019. Acceptance rate 6.4%.

Workshop Papers

- P. Pakiman, S. Nadarajah, N. Soheili, Q. Lin. *Self-guided Approximate Linear Programs* (**Link**). Accepted in **NeurIPS Workshop on Self-Supervised Learning – Theory and Practice**, 2020.

Work in Progress

- P. Pakiman, S. Nadarajah, Y. F. Lim. *Menu Optimization with Decision Learning.* In preparation to submit to **Operations Research**.
- S. Nadarajah, P. Pakiman. *Self-guided Least Squares Monte Carlo: Applications to Optimal Stopping.* Working paper.
- P. Pakiman, S. Nadarajah, N. Soheili, Q. Lin. *Average-Cost Self-guided Approximate Linear Programs.* Working paper.
- P. Pakiman, C. Landau, B.Haidar, S. Nadarajah. *A Simulation-based Reinforcement Learning Approach to Workflow Scheduling.* Working paper.
- D. R. Jiang, S. Nadarajah, P. Pakiman, Y. Wang. *Comparing Approximate Dynamic Programming Algorithms on Operations Management Applications.* Working paper.

TECHNICAL SKILLS

Programming language:	Python, C++, C, R, Java, HTML, JavaScript
Python package:	NumPy, SciPy, Pandas, Matplotlib, TensorFlow, Scikit-learn
Optimization solver:	Gurobi, AMPL, CVXPY, Pyomo, Nevergrad, OR-Tools
Operating systems:	Linux, MacOS, Windows

INVITED TALKS

Menu Optimization with Decision Learning

- POMS 32nd Annual Conference, Orlando, FL — Spring 2022
- POMS 31st Annual Conference, Virtual — Spring 2021

Self-adapting Robustness in Demand Learning

- INFORMS Annual Meeting, Virtual — Fall 2020
- INFORMS Revenue Management and Pricing Student Live Paper Series, **Link**, Virtual — Fall 2020

Self-guided Approximate Linear Programs

- INFORMS Optimization Society (IOS) Conference, Greenville, SC — Spring 2022
- INFORMS Annual Meeting, Anaheim, CA — Fall 2021
- POMS 30th Annual Conference, Washington D.C. — Spring 2019
- INFORMS Annual Meeting, Phoenix, AZ — Fall 2018
- POMS 29th Annual Conference, Houston, TX — Spring 2018

SMOILE: A Shopper Marketing Optimization and Inverse Learning Engine

- ACM SIGKDD, International Conference on Knowledge Discovery & Data Mining, **Link**, Anchorage, AK — Summer 2019

[1]Beta Gamma Sigma (BGS) is an International Business Honor Society (**Link**).

POSTER PRESENTATIONS

Self-guided Approximate Linear Programs

- NeurIPS 2020, Workshop on Self-Supervised Learning – Theory and Practice, **Link**, Virtual — Fall 2020

SMOILE: A Shopper Marketing Optimization and Inverse Learning Engine

- ACM SIGKDD, International Conference on Knowledge Discovery & Data Mining, **Link**, Anchorage, AK — Summer 2019

TEACHING EXPERIENCES

Lecturer, University of Illinois at Chicago — Since Spring 2019

- Business data mining (IDS 472), refresher series on *introduction to R*, slides for **week 1**, **week 2**, and **week 3**.
- Statistical models and methods for business analytics (IDS 575), *refresher series on linear algebra, calculus, and probability theory.*
- Statistical models and methods for business analytics (IDS 575), *applications of regression, classification and likelihood maximization*, **slides**.

Teaching Assistant, University of Illinois at Chicago — Since Spring 2017

- Advanced text analytics for Business (IDS 566)
- Business data mining (IDS 472)
- Business forecasting (IDS 476)
- Data science for online customer analytics (IDS 594)
- Introduction to operations management (IDS 532)
- Statistical models and methods for business analytics (IDS 575)

Teaching Assistant, University of Tehran — Spring 2014 - 2016

- Introduction to numerical analysis and scientific computing
- Numerical linear algebra

SERVICE

Reviewer

- International Conference on Learning Representations (ICLR) — Since Fall 2021
- Annals of Operations Research — Since Fall 2020
- Computers & Operations Research — Since Spring 2019
- Electronic Commerce Research — Since Spring 2018
- Information Systems and Operational Research — Since Fall 2018

Conference Organization

- Session co-chair, *Large-scale Linear Programs and Applications*, INFORMS Optimization Society Conference — Spring 2022
- Session chair, *Recent Advances in Reinforcement Learning*, INFORMS Annual Meeting — Fall 2021
- Session co-chair, *Social Responsibility and Risk in Supply Chains*, INFORMS Annual Meeting — Fall 2021

Membership

- IDS committee for organizing curriculum of *programming in R* — Spring 2021
- Beta Gamma Sigma (BGS) society — Since Spring 2021
- Institute for Operations Research and the Management Sciences (INFORMS) — Since Fall 2018
- Production and Operations Management Society (POMS) — Since Fall 2018