Sareh Nabi

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Education

Postdoc Scholar
Amazon Ads Early Career Scientist Program
Seattle, WA, USA, 2021-2023

Ph.D. in Operations Management
University of Washington
Information Systems and Operations Management Department
Seattle, WA, USA, 2013-2018

Master of Arts in Economics
Simon Fraser University, Department of Economics
Burnaby, BC, Canada, 2011-2012

Master of Science in Mathematics
Simon Fraser University, Department of Mathematics
Burnaby, BC, Canada, 2008-2011

Bachelor of Science in Mathematics
Sharif University of Technology, Department of Mathematics
Tehran, Iran, 2003-2007

Industry Research Positions

Applied Research Scientist
Amazon Ads, Oct 2023-present
In April 2024, we deployed Large Language Models (LLMs) in our Keyword Recommendation Service and launched the LLM-powered Keyword Group, a new targeting control for Sponsored Products keyword-based campaigns, enhancing advertisers' targeting strategies and campaign effectiveness. See API release notes and developer guide for more details.

- Identified giftable products and conducted opportunity sizing for the Gifting Keyword Group to maximize advertising campaign effectiveness during key gifting seasons.
- Engaged in prompt engineering, integrating diverse data sources to refine and optimize LLM performance in keyword generation.
- Conducted evaluations of LLM-generated keywords, comparing their performance against organic search benchmarks, and ensuring relevance through manual audits.

Postdoc Scholar
Amazon Ads Early Career Scientist Program, Sep 2021-Sep 2023
In collaboration with my colleagues and under the supervision of Dr. Lihong Li, I led:

– MESOB: Balancing equilibria & social optimality
  - Investigated multi-level and multi-agent games with a large number of anonymous agents balancing their individual interests with collective goals set by a social planner.
  - Developed a novel optimization framework, MESOB (Mean-field Equilibria & Social Optimality Balancing), that applies bi-objective and mean-field interactions.
  - Transformed MESOB into a single-objective optimization problem called MESOB-OMO using approximate Pareto efficiency and occupation measure optimization (OMO).

- Implemented and applied MESOB-OMO to simulated ad auctions and demonstrated its capability to enhance social welfare and reduce exploitability.
- Presented findings at SIAM Conference on Optimization, MarbleKDD, and Amazon Machine Learning Conference (AMLC).
- Under review; available on Amazon Science and arXiv: 2307.07911.

Additionally, I collaborated with scholar and scientists on the Auction team on:

– Advancing ad auction realism: Practical insights & modeling implications
- Analyzed modern online ad auctions, addressing key differences from traditional models.
- Modeled advertisers as agents using an adversarial bandit algorithm.
- Simulated 'soft-floor' auctions and compared revenue with that of optimal reserve prices.
- Inferred advertiser value distributions based on bids observed on an e-commerce website.
- Presented at AdKDD, and our work won the Sponsored Brand hackathon.
- Under review; available on Amazon Science and arXiv: 2307.11732.

Machine Learning Scientist
Microsoft, Oct 2017-Aug 2021
Selected Projects:

– Optimal Cloud Resource Allocation for Finance & Operations (F&O service)
- Performed comprehensive feature engineering using telemetry signals.
- Built a machine learning model that predicts Azure SQL Database Transaction Unit (DTU) with a high accuracy and recommended optimal database tier.
- Achieved annual savings of $2.9M by optimizing tiers for over 300 production databases.
- This project was in close collaborated with a group of researchers at Microsoft Research, and data science, performance, and COGS execution teams at Microsoft Dynamics.

– Customer Sentiment Driver Project
- The objective in this project was to track customers' sentiments, classify them, and correlate them with their actual usage. This helped to derive actionable insights and to prioritize work items related to delightful usage.
- Implemented search-based auto-tagging using text-mining capabilities.
- Obtained about 92% accuracy on our sentiments' classifications.

Internship Positions

Research Scientist Intern
Amazon, June-Sep. 2017

- Addressed two challenges in real-world applications: the absence of informative prior(s) in Bayesian settings and the inability to control parameter learning rates.
- Proposed a general framework to learn meta-prior from initial data using empirical Bayes.
- Implemented our proposed meta-prior framework and applied it to Generalized Linear Models.
- Performed experiments on a standard optimization problem as well as a contextual bandit setting in Amazon production system.
- Both during simulations and live experiments, our method showed marked improvements, especially in cases of small traffic.
- Published in Management Science Journal; Management Science 68(3):1737-1755. Also, available on arXiv: 2002.01129.

Product Intelligence Scientist Intern
Microsoft, June-Sep. 2015

- Investigated various machine learning models to learn business processes a customer is engaged in while navigating Finance & Operations application.
- Applied and implemented Hidden Markov Model in R-language to solve the problem.
- Obtained over 90% accuracy on predicting customer's behavior.

Data Scientist Intern
Microsoft, June-Sep. 2014

- Built a heat map of search intent and topic identification for tools provided by Life Cycle Services (LCS) in Finance and Operations product at Dynamics.
- Implemented and applied unsupervised topic clustering techniques on LCS search data logged internally. Analyzed and provided classification of search issues.
- Refined and labeled topic clusters based on more scaled data. Provided topic to business topics index map (business processes, issues, etc).

Computer Skills

Python, R, MATLAB, SQL, LaTex, MS Office, Exposures to C++, JAVA

Publications

MESOB: Balancing Equilibria & Social Optimality
Xin Guo, Lihong Li, Sareh Nabi, Junzi Zhang
Under review; available on Amazon Science and arXiv: 2307.07911.

Advancing Ad Auction Realism: Practical Insights & Modeling Implications
Ming Chen, Sareh Nabi, Marciano Siniscalchi
Under review; available on Amazon Science and arXiv: 2307.11732.

Bayesian Meta-Prior Learning Using Empirical Bayes
Sareh Nabi, Houssam Nassif, Joseph Hong, Hamed Mamani, Guido Imbens
Management Science 68(3):1737-1755, 2021; arXiv: 2002.01129.

Dynamic Pricing in the Presence of Strategic Behavior Using Thompson Sampling
Sareh Nabi, Hamed Mamani, David Simchi-levi
Working paper, 2021.

Study of Customer Behavior in a Revenue Management Setting Using Data-Driven Approaches, Sareh Nabi, PhD Thesis
Information System and Operations Management Department, University of Washington, 2018.

Paraglide: Interactive Parameter Space Partitioning for Computer Simulations
Steven Bergner, Michael Sedlmair, Torsten Moller, Sareh Nabi, Ahmed Saad
IEEE Transactions on Visualization and Computer Graphics, Vol. 19, Issue 9, pp. 1499-1512, 2013.

Equilibria of a Nonlocal Model for Biological Aggregations: Linear Stability and Bifurcation Studies, Sareh Nabi, M.Sc. Thesis
Department of Mathematics, Simon Fraser University, 2011.

Academic Positions

Research Associate
Foster School of Business, Information System and Operations Management Dept.
2017-2018

Performed research on dynamic pricing and demand learning in the presence of strategic customers. Applied multi-armed bandit modeling approach and implemented the solution in R-language.

Teaching Assistant
University of Washington, Foster School of Business, Seattle, WA, USA
Winter quarters 2014-2016

Taught Statistics to MBA students, held weekly review sessions, engaged students in discussions, provided homework support to 102 students, and graded their exams and homework.

Research Assistant
Pacific Institute for the Mathematical Sciences (PIMS), Simon Fraser University, Burnaby, BC, Canada
2009-2011

Modeled biological aggregations as a form of distributed behavior, implemented in MATLAB.

Analyzed the stability of the steady states.

Obtained and examined bifurcation diagrams using a visualization tool called ParaGlide.

Awards and Fellowships

Recipient of Evert McCabe Endowed Fellowship in Private Enterprise, University of Washington, 2016-2017.

Recipient of outstanding Teaching award, ISOM Department, University of Washington, Spring 2016.

Recipient of Doctoral Fellowships, Foster School of Business, University of Washington, 2013-2015.

Entrance Scholarship from Economics Department, Simon Fraser University, 2011.

Personal Interests

Curiosity: Learning about cosmology & the universe(s), contemplating fundamental questions.

Listening/Reading: Audiobooks on biography, history, and personal development on Audible.

Sports: Currently: swimming, running, and long walks. Previously: biking, basketball, and soccer.

Referees

Available upon request.