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Employment

Columbia University, New York, NY
2023 – *Associate Professor of Business*
2019 – 2023 *Assistant Professor of Business*

2018 – 2019 **Google Research**, Cambridge, MA
Postdoctoral Researcher, Operations Research Team

2015 **Jane Street Capital**, New York, NY
Trader Intern

2013 – 2015 **Lunarch Studios Inc.**, Waterloo, ON Canada
Co-founder
I took leave from MIT in 2013 to form the start-up Lunarch Studios, which launched the strategy game *Prismata* on the *Steam* platform.

Education

2015 – 2018 **Massachusetts Institute of Technology**, Cambridge, MA
2010 – 2012 *Ph.D. in Operations Research*
Advisor: David Simchi-Levi

2006 – 2010 **University of Waterloo**, Waterloo, ON Canada
B.Math with honors in Pure Mathematics and Combinatorics/Optimization

Journal Papers

1. **Order-optimal Correlated Rounding for Fulfilling Multi-item E-commerce Orders**

   Manufacturing & Service Operations Management, Articles in Advance

   *Accepted for presentation at the SIAM Conference on Applied and Computational Discrete Algorithms (ACDA), 2023

   *Selected for presentation in the MSOM Supply Chain Management SIG, 2022

2. **Assortment Planning for Recommendations at Checkout under Inventory Constraints** with Xi Chen, David Simchi-Levi, Linwei Xin

   Mathematics of Operations Research, Articles in Advance

   *Covered in Chicago Booth Review, 2018

3. **Fairness Maximization among Offline Agents in Online-Matching Markets** with Pan Xu, Yifan Xu

   ACM Transactions on Economics and Computation (TEAC), 2023

4. **Tight Guarantees for Static Threshold Policies in the Prophet Secretary Problem** with Nick Arnosti

   Operations Research, Articles in Advance

5. **When is Assortment Optimization Optimal?**

   Management Science, 2023

   *2nd Place, Rothkopf Junior Researcher Paper Prize for Auctions and Market Design

   *Selected for oral presentation in the MSOM Service SIG, 2021

   *Selected for oral presentation in the Market Innovation Workshop, 2021

6. **Bifurcating Constraints to Improve Approximation Ratios for Network Revenue Management with Reusable Resources** with Jackie Baek

   Operations Research (Technical Note), 2022

7. **Distributionally Robust Linear and Discrete Optimization with Marginals** with Louis Chen, Karthik Natarajan, David Simchi-Levi, Zhenzhen Yan

   Operations Research, 2022

8. **Revenue-Optimal Deterministic Auctions for Multiple Buyers with Ordinal Preferences over Fixed-Price Items**

   ACM Transactions on Economics and Computation (TEAC), 2022

9. **Inventory Balancing with Online Learning** with Wang Chi Cheung, David Simchi-Levi, Xinshang Wang

   Management Science, 2022

10. **Dynamic Pricing (and Assortment) under a Static Calendar** with David Simchi-Levi, Jinglong Zhao

    Management Science, 2021

11. **On Policies for Single-leg Revenue Management with Limited Demand Information** with David Simchi-Levi, Chung-Piaw Teo

    Operations Research, 2021

12. **Algorithms for Online Matching, Assortment, and Pricing with Tight Weight-dependent Competitive Ratios** with David Simchi-Levi

    Operations Research, 2020

    *Finalist, George E. Nicholson Student Paper Competition, 2017

13. **Separation between Second Price Auctions with Personalized Reserves and the Revenue Optimal Auction** with Balasubramanian Sivan

    Operations Research Letters, 2020

14. **Strong Mixed-Integer Programming Formulations for Trained Neural Networks** with Ross Anderson, Joey Huchette, Christian Tjandraatmadja, Juan Pablo Vielma

    Math Programming, 2020

15. **Improvements and Generalizations of Stochastic Knapsack and Markovian Bandits Approximation Algorithms**

    Mathematics of Operations Research, 2018

    *Honorable Mention, INFORMS Optimization Society Student Paper Competition, 2017

16. **Packing and Covering Triangles in Planar Graphs** with Qing Cui, Penny Haxell

    Graphs and Combinatorics, 2009

Working Papers

1. **Dynamic Pricing for Reusable Resources: The Power of Two Prices** with Santiago Balseiro, Wenxin Zhang

2. **From Contextual Data to Newsvendor Decisions: On the Actual Performance of Data-Driven Algorithms** with Omar Besbes, Omar Mouchtaki

3. **Assortment and Inventory Planning under Stockout-Based Substitution: The Many-Products Regime** with Jingwei Zhang, Huseyin Topaloglu

4. **Online Matching Frameworks under Stochastic Rewards, Product Ranking, and Unknown Patience** with Brian Brubach, Nathaniel Grammel, Aravind Srinivasan

    Operations Research, Minor Revision

5. **Degeneracy is OK: Logarithmic Regret for Network Revenue Management with Indiscrete Distributions** with Jiashuo Jiang, Jiawei Zhang

    Operations Research, Major Revision

6. **Beyond IID: Data-Driven Decision-Making in Heterogeneous Environments** with Omar Besbes, Omar Mouchtaki

    Management Science, Major Revision

7. **The Benefits of Delay to Online Decision-Making** with Yaqi Xie, Linwei Xin

    Management Science, Major Revision

    *Selected for presentation in the MSOM Supply Chain Management SIG, 2023

    *Covered in Chicago Booth Review, 2023

8. **Tight Guarantees for Multi-unit Prophet Inequalities and Online Stochastic Knapsack** with Jiashuo Jiang, Jiawei Zhang

    Operations Research, Major Revision

    *Jiashuo Jiang was a Finalist in the George E. Nicholson Student Paper Competition, 2022

9. **Multi-Stage and Multi-Customer Assortment Optimization With Inventory Constraints** with Elaheh Fata, David Simchi-Levi

    Operations Research, Major Revision

10. **A Competitive Analysis of Online Knapsack Problems with Unit Density** with David Simchi-Levi, Jinglong Zhao

Conference Papers

1. **Order-optimal Correlated Rounding for Fulfilling Multi-item E-commerce Orders**

   Proceedings of the 24th ACM conference on *Economics and Computation (EC)*, 2023

2. **Tightness without Counterexamples: A New Approach and New Results for Prophet Inequalities** with Jiashuo Jiang, Jiawei Zhang

   Proceedings of the 24th ACM conference on *Economics and Computation (EC)*, 2023

3. **A Nonparametric Framework for Online Stochastic Matching with Correlated Arrivals** with Ali Aouad

   Proceedings of the 24th ACM conference on *Economics and Computation (EC)*, 2023

4. **Optimizing for Strategy Diversity in the Design of Video Games** with Oussama Hanguir, Christopher Thomas Ryan

   Proceedings of the 24th Conference on *Integer Programming and Combinatorial Optimization (IPCO)*, 2023

5. **On (Random-order) Online Contention Resolution Schemes for the Matching Polytope of (Bipartite) Graphs** with Calum MacRury, Nathaniel Grammel

   Proceedings of the 34th Annual ACM-SIAM *Symposium on Discrete Algorithms (SODA)*, 2023

6. **Order Selection Problems in Hiring Pipelines** with Boris Epstein

   Proceedings of the 18th Conference on *Web and Internet Economics (WINE)*, 2022

7. **Constructing Demand Curves from a Single Observation of Bundle Sales** with David Simchi-Levi

   Proceedings of the 18th Conference on *Web and Internet Economics (WINE)*, 2022

8. **Online Bipartite Matching with Advice: Tight Robustness-Consistency Tradeoffs for the Two-Stage Model** with Billy Jin

   Proceedings of the 36th Conference on *Neural Information Processing Systems (NeurIPS)*, 2022

9. **Beyond IID: Data-Driven Decision-Making in Heterogeneous Environments** with Omar Besbes, Omar Mouchtaki

   Proceedings of the 36th Conference on *Neural Information Processing Systems (NeurIPS)*, 2022

10. **When is Assortment Optimization Optimal?**

    Proceedings of the 23rd ACM conference on *Economics and Computation (EC)*, 2022

11. **Tight Guarantees for Static Threshold Policies in the Prophet Secretary Problem** with Nick Arnosti

    Proceedings of the 23rd ACM conference on *Economics and Computation (EC)*, 2022

12. **Group-level Fairness Maximization in Online Bipartite Matching** with Pan Xu, Yifan Xu

    Proceedings of the 21st International Conference on *Autonomous Agents and Multi-Agent Systems (AAMAS)*, 2022

13. **Tight Guarantees for Multi-unit Prophet Inequalities and Online Stochastic Knapsack** with Jiashuo Jiang, Jiawei Zhang

    Proceedings of the 33rd Annual ACM-SIAM *Symposium on Discrete Algorithms (SODA)*, 2022

14. **Fairness Maximization among Offline Agents in Online-Matching Markets** with Pan Xu, Yifan Xu

    Proceedings of the 17th Conference on *Web and Internet Economics (WINE)*, 2021

15. **Improved Guarantees for Offline Stochastic Matching via new Ordered Contention Resolution Schemes** with Brian Brubach, Nathaniel Grammel, Aravind Srinivasan

    Proceedings of the 35th Conference on *Neural Information Processing Systems (NeurIPS)*, 2021

16. **Follow Your Star: New Frameworks for Online Stochastic Matching with Known and Unknown Patience** with Brian Brubach, Nathaniel Grammel, Aravind Srinivasan

    Proceedings of the 24th International Conference on *Artificial Intelligence and Statistics (AISTATS)*, 2021

17. **Reaping the Benefits of Bundling under High Production Costs** with David Simchi-Levi

    Proceedings of the 24th International Conference on *Artificial Intelligence and Statistics (AISTATS)*, 2021

18. **Revenue-Optimal Deterministic Auctions for Multiple Buyers with Ordinal Preferences over Fixed-Price Items**

    Proceedings of the 16th Conference on *Web and Internet Economics (WINE)*, 2020

19. **The Convex Relaxation Barrier, Revisited: Tightened Single-Neuron Relaxations for Neural Network Verification** with Christian Tjandraatmadja, Ross Anderson, Joey Huchette, Krunal Patel, Juan Pablo Vielma

    Proceedings of the 34th Conference on *Neural Information Processing Systems (NeurIPS)*, 2020

20. **Distributionally Robust Max Flows** with Louis Chen, Jim Orlin, David Simchi-Levi

    Proceedings of the 3rd ACM-SIAM *Symposium on Simplicity in Algorithms (SOSA)*, 2020

21. **Prophet Inequalities on the Intersection of a Matroid and a Graph** with Jackie Baek

    Proceedings of the 12th *Symposium on Algorithmic Game Theory (SAGT)*, 2019

22. **Tight Weight-dependent Competitive Ratios for Online Edge-weighted Bipartite Matching and Beyond** with David Simchi-Levi

    Proceedings of the 20th ACM conference on *Economics and Computation (EC)*, 2019

23. **Improvements and Generalizations of Stochastic Knapsack and Multi-armed Bandit Approximation Algorithms**

    Proceedings of the 25th Annual ACM-SIAM *Symposium on Discrete Algorithms (SODA)*, 2014

24. **A Geometric Approach to Combinatorial Fixed-point Theorems** with Elyot Grant

    Proceedings of the 7th *European Conference on Combinatorics, Graph Theory and Applications (EUROCOMB)*, 2013

25. **The Approximability and Integrality Gap of Interval Stabbing and Independence Problems** with Shalev Ben-David, Elyot Grant, Malcolm Sharpe

    Proceedings of the 24th *Canadian Conference on Computational Geometry (CCCG)*, 2012

Cases

1. **Ventilator Rationing during the Covid-19 Pandemic**
   Columbia CaseWorks
   *Finalist, Informs Case Competition, 2020

Grants

Columbia Center of AI Technology (CAIT) in collaboration with *Amazon*, "**Joint Selection and Inventory Optimization under Limited Capacity**", joint with Huseyin Topaloglu
Amount: $150,000; Duration: January 2022–June 2023

Teaching

Spring 2021, 2023 — **Columbia B9136 (PhD, Topics in Revenue and Supply Chain Management)**
Instructor

Spring 2020, 2021, 2022, 2023 — **Columbia B8108/B8109 (MBA, Supply Chain Management)**
Instructor

Spring 2017 — **MIT 15.762/15.763 (Supply Chain Management)**
Co-instructor

January 2012, 2013, 2016 — **MIT 15.S50 (Special Seminar in Management)**
Instructor and Course Designer

This is a course I designed based on my experience as a former professional poker player. It consists of eight 90-minute lectures and two problem sets, which grant a 1/4-credit at MIT. I use the game of poker to illustrate concepts in probability and statistics, and more generally, as a framework within which to think about difficult decisions, uncertainty, risk, and a good outcome vs. a good decision. This has now become a yearly course at MIT, and has been placed onto MIT OpenCourseWare. Furthermore, I have been invited to give the introductory lecture from this course, "The Joy of Making Good Decisions", at various venues, including *Google New York*, *Riot Games*, the *MIT Entrepreneurship Center*, and for the *MIT Master of Finance* program.

Academic Mentorship

Current students: Omar Mouchtaki (Columbia DRO; co-advised with Omar Besbes), Boris Epstein (Columbia DRO), Wenxin Zhang (Columbia DRO; co-advised with Santiago Balseiro), Yaqi Xie (Chicago Booth; co-advised with Linwei Xin)

Other student collaborators: Billy Jin (Cornell ORIE), Nathaniel Grammel (Maryland CS), Mohammad Aminian (Chicago Booth)

Former students: Jiashuo Jiang (NYU Stern Ph.D. 2022; co-advised with Jiawei Zhang)

Thesis committee member: Xingyu Zhang (Columbia IEOR Ph.D. 2021), Oussama Hanguir (Columbia IEOR Ph.D. 2022), Judy Gan (Columbia DRO Ph.D. 2023), Noemie Perivier (Columbia IEOR Ph.D. 2023)

Other Professional Activities

Associate Editor for journals: Management Science

Program Committee for conferences: WINE 2023 (Senior PC), EC 2023, WINE 2022, EC 2022, WINE 2021, EC 2021

Reviewer for journals: Mathematics of Operations Research, Naval Research Logistics, Operations Research, Production and Operations Management, Management Science, Algorithmica, SIAM Journal on Discrete Mathematics, Manufacturing & Service Operations Management, INFORMS Journal on Computing, ACM Transactions on Economics and Computation

Subreviewer for conferences: STOC 2023, IPCO 2023, ITCS 2023, NeurIPS 2022, ESA 2022, SODA 2021, SODA 2020, SODA 2018

Co-chair for Revenue Management & Pricing (RMP) Cluster at INFORMS Annual Meeting, 2022

Co-organizer of IEOR-DRO seminar series at Columbia, 2021 –

Organizer of DSL seminar series at MIT, 2016 – 2018

Visiting Scholar, hosted by Prof. Chung-Piaw Teo of the Department of Analytics & Operations in NUS Business School, January 2017

Co-supervisor (with David Simchi-Levi) of Arjun Khandelwal through the MIT Undergraduate Research Opportunities Program (UROP), working on "Predicting User Choice in Video Games"

Invited Talks

2022 Columbia DRO Brown Bag seminar; Tiger Analytics academic seminar; Simons Institute weekly seminar for Data-driven Decision Processes program; Berkeley IEOR weekly seminar; MIT Operations Research seminar series; UIUC ISE weekly seminar

2021 NYU Stern, OM seminar; Stanford Business School, OIT seminar; 2nd Workshop on Information and Learning, INSEAD; HKUST Business School, ISOM seminar; University of Maryland, Theory CS group CATS seminar

2020 CBS PFS No Free Lunch seminar; UMD Smith; USC Marshall

2019 NJIT Tuchman; Cornell Tech; DSL seminar, MIT; 1st Workshop on Information and Learning, IESE Barcelona; Core Data Science, Facebook Research; Algorithms Seminar, Google Research NYC

2018 Duke Fuqua, Operations Management; Columbia IEOR-DRO seminar; Harvard Kennedy School, Quantitative Analysis; WUSTL Olin, Operations and Manufacturing Management; Georgia Tech ISyE; CMU Tepper, Operations Research; UW Foster, Operations Management; UCLA Anderson, Decisions, Operations, and Technology Management; Chicago Booth, Operations Management

2017 UVA Darden, Quantitative Analysis; INSEAD, Technology and Operations Management; Northwestern Kellogg, Operations Management; Dartmouth Tuck, Operations and Management Science; MIT Sloan, Operations Management seminar; Stanford Market Innovation Workshop; Princeton ORFE; NYU Stern, Operations Management seminar; NUS Business School, Analytics & Operations seminar; SUTD Engineering Systems and Design seminar

2016 Cornell ORIE Ph.D. Student Workshop

Outside Activities

Columbia Business School requires faculty members to disclose any activities that might present a real or apparent conflict of interest. I currently have no outside activities fitting this description.