JUNYI SHA

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EDUCATION

Massachusetts Institute of Technology **Cambridge, MA**
Ph.D. in Computational Science and Engineering | GPA: 4.9/5.0 Sept. 2021 - May 2026 (expected)
Coursework: Deep Learning, Efficient Machine Learning on LLM, Generative AI, Computer Vision, Optimization
Research Advisor: David Simchi-Levi
Thesis: AI for fashion: multimodal demand forecasting and feature-level design optimization

New York University **New York, NY**
B.S. in Mathematics, Computer Science; Minor in Biomolecular Science | GPA: 3.98/4.0 Sept. 2017 - May 2021
Coursework: Machine Learning, Computer Vision, Natural Language Processing, Numerical Analysis, Mathematical Modeling, Data Structures, Algorithms, Quantitative Finance, Probability, Big Data, Data Science
Honors: George Bachman Award, summa cum laude

PUBLICATIONS & PAPERS (* Alphabetical Order)

1. Xi Xiong, **Junyi Sha**, and Li Jin. "Optimizing coordinated vehicle platooning: An analytical approach based on stochastic dynamic programming." *Transportation Research Part B: Methodological 150 (2021): 482-502.*
2. Anav Agrawal*, Hanwei Li*, Yuxiang Liu*, **Junyi Sha***, David Simchi-Levi*, and Michelle Xiao Wu*. "Image-based similarity for demand forecasting: a novel multimodal method to exploit images' latent information." Under review at *Management Science*
3. Xiaomin Li*, **Junyi Sha***, and David Simchi-Levi*. "AI Tailoring: Evaluating Influence of Image Features on Fashion Product Popularity." arXivpreprint arXiv:2411.14737 (2024). Working Paper
4. Junyi Sha, Renfei Tan, and David Simchi-Levi. "Language-based Reinforcement Learning". Working Paper, preliminary results in blog post
5. Junyi Sha, Camilo Mora Quiñones, and Josué C. Velázquez Martínez. "Computer Vision for Retail Product Recognition and Counting". Working Paper

INVITED TALKS

1. *Computer Vision for Retail Product Recognition*, MIT-CTL 2025 Fall Seminar Series, Cambridge, MA
2. *AI Tailoring*, Job Market Showcase "Novel AI Applications and Perspective" Session Chair, INFORMS Annual Meeting 2025, Atlanta, GA
3. *AI Tailoring*, Purdue Operations Conference 2025, West Lafayette, IN
4. *AI Tailoring*, MIT Data Science Lab Spring 2025 Seminar Series, Cambridge, MA
5. *AI Tailoring*, INFORMS Annual Meeting 2024, Seattle, WA
6. *Image-Based Similarity for Demand Forecasting*, MSOM Conference 2024, Minneapolis, MN
7. *Image-Based Similarity for Demand Forecasting*, INFORMS Annual Meeting 2023, Phoenix, AZ

RESEARCH EXPERIENCE

Massachusetts Institute of Technology, MIT Data Science Lab Cambridge, MA
Research Assistant, Advisor: David Simchi-Levi Jan. 2022 – Present
Project: AI for fashion: multimodal demand forecasting and feature-level design optimization

- Addressed the cold-start challenge for new fashion items by building a multimodal prediction model that fuses structured data, text, and visual features.
- Extracted image embeddings with neural nets/Transformers, engineer visual-similarity features, and feed them to a gradient-boosting model; on a large real-retail dataset, reduce error metrics (RMSE/MdAPE) by more than 8.5%.
- Proposed a quantitative protocol to evaluate image-embedding quality and show it is a reliable indicator of downstream model performance; validate robustness and generalization on public datasets.
- Introduced influence score system and use diffusion models and consumer experiments to verify the importance of key visual features; confirm prediction accuracy via surveys and user rankings.
- Built an automated fashion image-analytics framework to support new product design and marketing strategies, demonstrating that AI-edited designs are preferred to original designs.

Massachusetts Institute of Technology, MIT LIFT Lab — Cambridge, MA
Research Assistant, Advisor: Josué Velázquez Martínez — Jan. 2025 – Present

Project: Computer vision for retail product recognition and counting

- Tackled dense, overlapping, perspective-skewed shelves that make bottle counting difficult for nanostores. Built an end-to-end image pipeline from photo input to per-shelf/column counts.
- Trained YOLOv8 with Soft-NMS and near-border recovery to cut duplicate boxes in overlaps. Added vanishing-point estimation and column alignment with geometric constraints to cluster by height and correct perspective, yielding consistent column-wise counts.
- Productionized the system as a lightweight app on Microsoft Azure with WhatsApp integration

New York University, C2SMART Department of Transportation Center — Brooklyn, NY
Research Assistant, Advisor: Li Jin — May 2019 – Aug. 2021

Project: Optimizing coordinated vehicle platooning

- Studied vehicle platoon coordination at freeway on-ramps, modeling it as an MDP to minimize long-run fuel use.
- Proved the optimal policy is threshold-based: a vehicle merges into a platoon when its predicted arrival-time gap at the ramp is below a threshold.
- Developed two efficient, implementable algorithms that are much faster than value iteration; under Poisson arrivals, derived an analytical solution.
- Simulations with real traffic data show better fuel economy and higher throughput than traditional approaches.

New York University, Modestino Group — Brooklyn, NY
Research Assistant, Advisor: Miguel A. Modestino — May 2018 – Aug. 2018

Project: Differential Pulse Amperometry: Electrohydrodimerization of Acrylonitrile to Adiponitrile

- Investigated DPA control parameters and their effect on AND:PN selectivity and production rate in an industrially relevant reaction.
- Built experiments and analysis pipeline and presented findings in a poster in 2018 Summer Research Presentations

TEACHING & STUDENT MENTORING

Spring 2024	**MIT 1.266 Supply Chain and Demand Analytics** Graduate course for business school students, Guest Lecturer, Teaching Assistant
Spring 2019 - Fall 2020	**NYU CS-UY-1133 Engineering Problem Solving and Programming** Undergraduate course for engineering students, Teaching Assistant, Weekly Recitation Instructor
Fall 2018 – Spring 2019	**Polytechnic Tutoring Center** Peer tutor in small group setting for biology I, chemistry I, calculus I/II/III, linear algebra
Research Advisees:	Tingying Yan (undergrad, Peking University, 06/2022 - 05/2023, now graduated from MIT MBAn master program); Yuxiang (Jim) Liu (undergrad, UCLA, 06/2023 - 05/2024, now Ph.D. student at Stanford MSE); Yimin Tang (undergrad, Peking University, 09/2023 - 05/2024, now Ph.D. student at University of Michigan Ross); Anav Agrawal (undegrad, Indian Institute of Technology Delhi, 09/2024 - 05/2025)

INDUSTRY EXPERIENCE

Summer 2025	***Applied Scientist Intern***, **Apple** Worldwide Business Process Re-engineering, Sunnyvale, CA
Summer 2024	***Map AI/ML Scientist Intern***, **General Motors** AI/ML Scientist Engineering Group, Austin, TX
Summer 2020	***Data Scientist Intern***, **Shoptaki** Software Development Team, New York City, NY
Winter 2019	***Business Analyst Intern***, **Accenture** Accenture Digitals, Shanghai, China

SELECTED INDUSTRIAL COLLABORATIONS

2023 - 2024	**PwC**, Middle East Branch, research collaborations on studying supply chain localization
2023 Spring	**Floating Point Group**, research collaborations on crypto market volatility analysis

2022 - 2023	**Zebra Technologies**, research collaborations on studying inventory inaccuracy problems
2021 - 2022	**Mango**, research collaborations on improving fashion product demand forecasting

HONORS & AWARDS

2025	iContest 2025 second place, Apple (out of 160+ teams)
2021	Roger Foott Memorial Fellowship, Massachusetts Institute of Technology
2021	George Bachman Award, New York University
2020	Mathematical Contest in Modeling Problem A Finalist ((top 1% out of 13749 teams))

SERVICES

2025 Fall	**INFORMS 2025 Job Market Showcase**, *Session Chair*
2025 Fall	**MIT Data Science Lab Seminar Series**, *Organizer*
2025 Fall	**NeurIPS 2025 Workshop "Reliable ML from Unreliable Data"**, *Reviewer*
2019 - 2020	**Tau Beta Pi (NY Rho Chapter)**, *Vice President*
2016 - Present	**TED Talks**, *Official Translator*