Mohsen Bahrami

Research Scientist
MIT Connection Science Group
Sociotechnical Systems Research Center
Institute for Data, Systems, and Society
Massachusetts Institute of Technology

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Academic History & Research Experience

Massachusetts Institute of Technology *Cambridge, MA*
MIT Connection Science, IDSS, SSRC *Nov 2022 - Present*
Research Scientist
Supervisor: Professor Alex 'Sandy' Pentland

Massachusetts Institute of Technology *Cambridge, MA*
MIT Connection Science, SSRC, IDSS *Nov 2019 - Nov 2022*
Postdoctoral Research Associate
Supervisor: Professor Alex 'Sandy' Pentland

Sabanci University *Istanbul, Turkey*
Sabanci Business School *Sep 2018 - Nov 2019*
Postdoctoral Research Fellow
Supervisor: Professor Burcin Bozkaya

Massachusetts Institute of Technology *Cambridge, MA*
MIT Media Lab, Human Dynamics Group *Oct 2017 - Apr 2018*
Visiting Researcher
Advisors : Prof. Alex 'Sandy' Pentland, Prof. Burcin Bozkaya, & Prof. Selim Balcisoy

Sabanci University *Istanbul, Turkey*
Behavioral Analytics and Visualization Lab *May 2015 - Nov 2019*
Ph.D. Research
Advisors : Prof. Burcin Bozkaya & Prof. Selim Balcisoy

Sabanci University *Istanbul, Turkey*
Sabanci Business School *2018*
Ph.D. in Operations and Information Management
Advisors: Prof. Burcin Bozkaya, Prof. Selim Balcisoy, & Prof. Alex 'Sandy' Pentland
Dissertation Title: "Behavioral Analytics: Understanding Individual and Group Behavior Using Transactional Big Data"

Amir Kabir University of Technology (Tehran Polytechnic) *Tehran, Iran*
Department of Management, Science, and Technology *2012*
Master of Business Administration
Advisor: Professor Hooman Attar
Thesis Title: "A Risk Breakdown Structure for New Telecom Operator *RighTel*"

Sharif University of Technology *Tehran, Iran*
School of Electrical and Computer Engineering *2007*
B.S. in Electrical Engineering & Computer Science
Advisor: Professpr Bijan Vosooghi Vahdat
Thesis Title: "Computational Methods for Calculating Electromagnetic Fields of Geometric Shaped Wires"

Research Interests	Business and marketing analytics, Firm performance prediction, Location recommender models using spending and mobility data, Privacy-preserving methods for secure information sharing among businesses

Research Collaboration with Industry	**Financial Organizations:** MasterCard (AI Garage initiative), M&T Bank, BankSA-Westpac Australia, BBVA Bank Turkey and Mexico, Akbank Turkey.

Telcos, Location Intelligence, & IT Companies: Safegraph USA, DSpark-Optus Australia, Turktelekom, i2i Systems Turkey.

Manufacturing & Retail: Filli Boya Turkey, Tramontina Brazil, Althoff Chain Supermarket Stores Brazil. |

Refereed Journal Publications * equal contribution † Student supervised	**Bahrami, M.**, Boz, H. A.[†, *], Suhara, Y., Bozkaya, B., Balcisoy, S., & Pentland, A. (2023). "Predicting merchant future performance using privacy-safe network-based features", *Scientific Reports, DOI: 10.1038/s41598-023-36624-0*

Netto, C. F. S., **Bahrami, M.**, Brei, V., Bozkaya, B., Balcisoy, S., & Pentland, A. (2023). "Disaggregating Sales Prediction: A Gravitational Approach", *Expert Systems with Applications, 217, 119565.*

Horn, A. L., Bell, B. M., Garcia Bulle Bueno, B., **Bahrami, M.**, Bozkaya, B., Cui, Y., Wilson, J. P., Pentland, A., Moro, E., & de la Haye, K. (2023). "Investigating mobility-based fast food outlet visits as indicators of dietary intake and diet-related disease.", *Forthcoming at Nature Digital Medicine.*

Bahrami, M., Xu, Y.[†], Tweed, M., Bozkaya, B., & Pentland, A. (2022). "Using Gravity Model to Make Store Closing Decisions: A Data Driven Approach", *Expert Systems with Applications, 205, 117703.*

Maleki, M.[†], **Bahrami, M.**, Menendez, M., & Balsa-Barreiro, J. (2022). "Social Behavior & COVID-19: Analysis of the Social Factors behind Compliance with Interventions across United States", *International Journal of Environmental Research & Public Health, 19(23), 15716.*

Suhara, Y., **Bahrami, M.**, Bozkaya, B., & Pentland, A. S. (2021). "Validating gravity-based market share models using large-scale transactional data", *Big Data, 9(3), 188-202.*

Bahrami, M., Bozkaya, B., & Balcisoy, S. (2020). "Using Behavioral Analytics to Predict Customer Invoice Payment", *Big Data, 8(1), 25-37.*

Chong, S. K.[*], **Bahrami, M.**, Chen, H., Balcisoy, S., Bozkaya, B., & Pentland, A., (2020). "Economic outcomes predicted by diversity in cities", *EPJ Data Science, 9(1), 17.*

Ak, R., **Bahrami, M.**, & Bozkaya, B. (2020), "A Time-Based Model & GIS Framework for Assessing Hazmat Transportation Risk in Urban Areas", *Journal of Transport & Health, 19, 100943.* |

Proceedings

Chawla, A., Mulay, N., **Bahrami, M.**, Bishnoi, V., Katyal, Y., Moro, E., Saraswat, A., & Pentland, A. (2022), "Post-pandemic Economic Transformations in the United States of America", *International Conference on Data Mining (ICDM). Workshop on Social Data Mining (SocDM2022), IEEE, 1186-1190.*

Loaisa, I., South, T., Sanchez, G., Chan, S., Yu, A., Montes, F., **Bahrami, M.**, & Pentland, A. (2022), "Voyage Viewer: Empowering human mobility at a global scale", *EuroVis Visual Analytics* (EuroVA 2022).

Mulay, N., Bishnoi, V., Katyal, Y., **Bahrami, M.**, Moro, E., Saraswat, A., & Pentland, A. (2021), "Effects of Stimulus Payments on Consumer Spending During COVID-19 Pandemic", *International Conference on Data Mining (ICDM). Workshop on Social Data Mining (SDM), IEEE, 873-877.*

Horn, A.L., de la Haye, K., Moro, E., Wilson, J., Valente, T., Bozkaya, B., **Bahrami, M.** and A. Pentland (2020). "Objective Measurements of Food Environment Exposure and Access in Los Angeles from Big Mobility Data", *Annals of Behavioral Medicine, 54, S469-S469.*

Boz, H. A., **Bahrami, M.**, Suhara, Y., Bozkaya, B., & Balcisoy, S. (2020). "An Exploratory Visual Analytics Tool for Multivariate Dynamic Networks", *EuroVis Visual Analytics* (EuroVA 2020).

Bahrami, M., Findik, Y., Bozkaya, B. & Balcisoy, S. (2018). "Twitter Reveals: Using Twitter Analytics to Predict Public Protests", *Proceedings of NERCCS 2018: The First Northeast Regional Conference on Complex Systems, Binghamton, NY* (April 2018).

Book Chapters

Loaiza Saa, I., Serena Chen, Sánchez Sarmiento, G. A., **Bahrami, M.**, & Pentland, A. (2022). "Voyage Viewer: A Visual Multivariate Dynamic Exploration Tool for Migration and Mobility Studies", *In "Data Science for Migration and Mobility", (pp. 267–288).* British Academy.

Bakker, M. A., Piracha, D. A., Lu, P. J., Bejgo, K., **Bahrami, M.**, Leng, Y., Balsa-Barreiro, J., Ricard, J., Morales, A. J., Singh, V. K., Bozkaya, B., Balcisoy, B., and Pentland, A., (2019). "Measuring fine-grained multidimensional integration using mobile phone metadata: the case of Syrian refugees in Turkey", *In "Guide to Mobile Data Analytics in Refugee Scenarios", (pp. 123-140).* Springer, Cham.
Note: This research won an **'Honorable Mention Award'** in Data for Refugee challenge (D4R 2019).

Preprints & Manuscripts Under Review

Bahrami, M., "Towards using aggregated data in research", *Perspective paper under review by Big Data journal.*

Xu, Y.[†], **Bahrami, M.**, & Pentland, A. "Temporal persistence of consumer behavioral shifts in response to the COVID-19 pandemic", *Submitted to Journal of Marketing Research.*

Boz, H. A., **Bahrami, M.**, Balcisoy, S., Bozkaya, B., Mazar, N., Nicholas, A., & Pentland, A. "One City, Two Tales: Using Mobility Networks to Understand Neighborhood Resilience and

Fragility during the COVID-19 Pandemic", *under review by Nature Humanities and Social Sciences Communications, available at* *https://arxiv.org/abs/2210.04641*.

Bueno, B.G.B., Horn, A.L., Bell, B.M., **Bahrami, M.**, Bozkaya, B., Pentland, A., De la Haye, K. and Egido, E.M. (2022). "You are where you eat: Effect of mobile food environments on fast food visits", medRxiv (2022), *R2 with minor revisions: Nature Communications.*

Hejazi, M. M., Golabi, F., **Bahrami, M.**, Kahroba, H., & Hejazi, M. S. (2022). "FMSClusterFinder: A new tool for detection and identification of clusters of sequential motifs with varying characteristics inside genomic sequences". *bioRxiv (2022).*

MANUSCRIPTS IN PREPARATION

Tohidi, A., **Bahrami, M.**, & Pentland, A.. "Understanding dynamics of restaurant foot-traffic recovery: A case study of the Covid-19 pandemic".

Yoon, J., **Bahrami, M.**, Jung, WS., Balcisoy, S., Bozkaya, B., Pentland, A., & Ahn, YY. "Business2Vec: Analysis of the relationship between a merchant's revenue and its surrounding businesses' category diversity".

Tanvir, A., Kaya, E., **Bahrami, M.**, Monti, F., Balcisoy, S., Lepri, B., Bronstein, M., & Bozkaya, B., "Customer Churn and Co-churn Prediction Using Geometric Deep Learning".

GRANTS

Contributed to more than $\underline{\$2,000,000}$ sponsor funded collaborative projects.

MIT Sloan Latin America Office: Research funding for project entitled "Estimating Informal Income and Purchase Patterns in Colombia". Amount: $16,000.00 (2022).

Marketing Science Institute (MSI) Competition on "Learning from Disruption: New Connections, New Directions post-COVID": Research funding to support the project "Dynamic Product Embedding For Heterogeneous Purchase Network: An Application To Omnichannel Midst And Post COVID Pandemic". Amount $10,400 (2021).

The Brazilian National Council for Scientific and Technological Development (CNPq): Funding to support the 'Brazil Atlas of Opportunity' project. Amount: R$165,000.00 (2021).

Go2Gov SA: South Australian government's grant for 'Peak', an early stage startup for proof of concept development. Amount: AUD 150K. Helped secure the grant as advisor (2021).

FAPERGS: Research Funding Agency of the State of Rio Grande do Sul, Brazil, "Development of a low-cost method for sales and demand forecasting based on spatial models". Amount: R$81,460.00 (2019).

TEACHING INTERESTS

Business & Marketing Analytics, Quantitative Analysis Techniques, Machine Learning with Applications, Experimental Design & Causal Inference, Probability & Statistics, Econometrics.

Teaching Experience

Sabanci Business School, Sabanci University *Istanbul, Turkey*
Course Title: Introduction to Data Analysis & Research in Business *Summer 2019*
Role: Course Instructor
Syllabus: Available here
Management Undergraduate and Business Analytics Minor Programs

- **Audience:** Sophomore and Junior students
- **Course Capacity:** 60 Students
- **Course Type:** Required Course
- **Area Elective course** for undergraduate students in Computer Science & Engineering program
- **Content:** This course teaches practical perspectives on research design, data collection, and analysis useful for managers.
- **Responsibilities:** Designed and wrote the syllabus, presented the lectures and led both teaching and recitation sessions, designed and prepared course projects, homework and exam problems.

Sabanci Business School, Sabanci University *Istanbul, Turkey*
Course Title: Operations Management *Summer 2018*
Role: Course Instructor
Syllabus: Available here
Management Undergraduate Program

- **Audience:** Junior and Senior students
- **Course Capacity:** 30 Students
- **Course Type:** Core Elective course
- **Content:** This course exposes the students to issues such as product and process design, capacity planning, inventory planning, and quality management at varying levels of decision making from strategic to operational.
- **Responsibilities:** Designed and wrote the syllabus, presented the lectures and led both teaching and recitation sessions, designed and prepared course projects, homework and exam problems.

Co-Teaching & TA Experience

Sabanci Business School, Sabanci University *Istanbul, Turkey*
Introduction to Business Analytics *Spring 2017, Summer 2017, Spring 2019*
Operations Management *Summer 2015, Fall 2015, Fall 2017*
Introduction to Probability *Spring 2016*
Customer Relationship Management Using Location Intelligence *Spring 2015*
Supply Chain Management *Fall 2014*
Management Undergraduate Program and Business Analytics Minor program

- Was actively involved in helping the instructors with the teaching process of the courses, including co-teaching, presenting lectures, and leading class discussions
- Led the recitation sessions and gave review lectures
- Helped with homework and exams preparation and grading tasks

Mentoring & Advising Experience

Massachusetts Institute of Technology *Cambridge, MA*
Postdoc Mentoring Program for Ph.D. Students *Fall 2020*
- Mentored **three** IDSS Ph.D. students.

Massachusetts Institute of Technology   *Cambridge, MA*
Advising and Mentoring Undergraduate Students   *Fall 2017 - Present*
MIT Undergraduate Research Opportunities Program (UROP)
- This program supports research partnerships between undergraduate students and faculty.
- Mentored **twenty six** undergraduate students since Fall 2017.
- Co-authored **two** book chapters with **five** of the students
- **Fifteen** students were involved in development the 'Atlas of Opportunity' website and related research projects

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SELECTED
SEMINARS
INVITED TALKS
& CONFERENCES

Bahrami, M., Tohidi, A., & Pentland, A., Surprising Negative Association of customer Diversity with Restaurants' Post-COVID19 Foot Traffic Recovery, *BARI Conference 2023: Greater Boston's Annual Insight-to-Impact Summit, Boston, MA, USA* (April 2023)

Bahrami, M., Leng, Y., & Pentland, A., Dynamic Product Embedding For Heterogeneous Purchase Network: An Application To Omnichannel Midst And Post COVID Pandemic, *Invited talk at INFORMS Annual Meeting* (October 2022).

Aaron Nichols, Nina Mazar, Selim Balcisoy, Burcin Bozkaya Bahrami, M., Boz, HA., Nichols, A., Mazar, N., Balcisoy, S., Bozkaya, B., & Pentland, A., Neighborhood Resilience and Fragility to the COVID-19 Pandemic from a Mobility Network Perspective: The Case of New York City, *IC2S2, Chicago, IL, USA* (July 2022).

Mulay, N., Bishnoi, V., Katyal, Y., Bahrami, M., Moro, E., Saraswat, A., & Pentland, A., Effects of Stimulus Payments on Consumer Spending During COVID-19 Pandemic, *International Conference on Data Mining (ICDM). Workshop on Social Data Mining (SDM), IEEE, Auckland, New Zealand,* (December 2021)

Bahrami, M., Xu, Y., Tweed, M., Bozkaya, B., & Pentland, A., Making Hard Decisions: Which Stores to Close?, *European Conference on Operational Research (EURO 2021), Athens, Greece,* (July 2021).

Bozkaya, B., Netto, C.F.S., Bahrami, M., Brei, V., Balcisoy, S., & Pentland, A., Gravitational Forecasting Reconciliation: Sales prediction without historical data, *LOD 2020 – The Sixth International Conference on Machine Learning, Optimization and Data Science* (July 2020).

Bahrami, M., Horn, A., De La Haye, K., Pentland, A., & Moro, E., Leveraging Big Mobility Data to Understand Food Access and Eating Behavior Beyond the Neighborhood, *IC2S2, Cambridge, MA, USA* (July 2020).

Bahrami, M., Suhara, Y., Boz, H. A., Balcisoy, S., Bozkaya, B., & Pentland, A., Merchant Financial Well-being Prediction Using Network Features, *IC2S2, Cambridge, MA, USA* (July 2020).

Netto, C.F.S., Bahrami, M., Brei, V., Balcisoy, S., Bozkaya, B., & Pentland, A., GRAVITATIONAL FORECAST RECONCILIATION, *42nd Annual ISMS Marketing Science Conference, Durham, NC, USA* (June 2020).

Bahrami, M.., Chong, S. K., Chen, H., Balcisoy, S., Bozkaya, B., & Pentland, A., *International Conference of Social Computing, Beijing, China* (August 2019).

Boz, H. A., Bahrami, M., Suhara, Y., Bozkaya, B., & Balcisoy, S., An Exploratory Visual Analytics Tool for Multivariate Dynamic Networks. *11th Workshop on Visual Analytics (EuroVA),*

a co-lacted event in EuroVis (May 2020).

Bahrami, M., Findik, Y., Bozkaya, B. & Balcisoy, S., Twitter Analytics Predict Public Protests, *ECSCW 2019 Materializing Activism Workshop, Salzburg, Austria*, (June 2019).

Bozkaya, B., Chong, S.K., Bahrami, M., Chen, H., Balcisoy, S. & Pentland, A., Exploring Drivers for Economic Growth Using Mobility and Transactional Data, *Challenges of Europe 2019, Bol, Croatia* (May 2019).

Bozkaya, B., Bahrami, M., Suhara, Y., Chong, S.K., Chen, H., Balcisoy, S. & Pentland, A., Human Mobility Networks: Using Gravity Models to Explain Food Foraging Behavior and More, *NetSci 2019, Burlington, VT, USA* (May 2019).

Suhara, Y., Bahrami, M., Bozkaya, B., & Pentland, A., A Gravity Model Of Market Share Based On Transaction Records, *Ninth International Conference on Complex Systems, ICCS 2018, Cambridge, MA, USA* (July 2018).

Bahrami, M., Findik, Y., Bozkaya, B. & Balcisoy, S., Twitter Reveals: Using Twitter Analytics to Predict Public Protests, *NERCCS 2018: First Northeast Regional Conference on Complex Systems. Binghamton, NY, USA* (April 2018).

Suhara, Y., Bahrami, M., Bozkaya, B. & Pentland, A., A Gravity Model of Market Share Based on Transaction Records, *INFORMS Business Analytics Conference, Baltimore, MD* (April 2018).

Bahrami, M., Bozkaya, B. & Balcisoy, S., Using Predictive Analytics to Learn and Predict Customer Invoice Payment Behavior, *IC2S2 2017, Cologne, Germany* (July 2017).

Bahrami, M., Leveraging Big Mobility Data to Understand Food Access and Eating Behavior Beyond the Neighborhood, *SAHMRI Scientific Seminar, Adelaide, South Australia* (May 2021).

Bahrami, M., A network analysis perspective to understanding the impacts of COVID-19 on mobility patterns, *Placekey Seminar Series* (April 2021).

Bahrami, M., Making hard decisions: Which stores to close?, *Placekey Seminar Series* (November 2020).

Bahrami, M., Understanding Social and Economic Impact of the Outbreak using Mobility Data, COVID-19: An Interdisciplinary Approach to the Understanding of a Pandemic course offered at *New College of Florida* (September 2020).

Bahrami, M., Data-driven insights for Tourism Industry, *'Tourism Meets Tech' Seminar by FO-MENT, Adelaide, South Australia* (June 2020).

Bahrami, M., Merchant Life in the Network: Predicting Financial Well-being Using Network Features, *Sabanci University Science Seminars: 'Science Never Stops'* (May 2020).

Bahrami, M., Economic outcomes predicted by diversity in cities, *MIT Connection Science Trusted Data* (March 2020).

Bahrami, M., Good Cities Are Goods, *CITIES4PEOPLE: INTELLIGENT DATA ANALYT-ICS FOR NEXT-GEN CITIES, JADS campus in 's-Hertogenbosch, The Netherlands* (November 2018).

Bahrami, M., Using Predictive Analytics to Learn and Predict Customer Invoice Payment Behavior, *Seminar Series #2, BAV Lab, Sabanci University, Istanbul, Turkey* (October 2016).

REVIEWER SERVICES	Scientific Reports, Big Data Journal, International Journal of Forecasting, Complexity, Array, EPJ Data Science, International Journal of Information Management, Frontiers in Big Data, PLOS ONE, Journal of Transport & Health, Journal of Retailing & Consumer Services.

COMMUNITY SERVICES	Program Committee Member for International Conference on Computational Social Science (IC2S2 2023), Copenhagen, Denmark (July 2023).
	Program Committee Member for the Second IEEE International Workshop on Social Data Mining in the Post-pandemic Era (SocDM 2022) and International Conference on Data Mining (ICDM2022), Orlando, FL, USA (November 2022).
	Program Committee Member for International Workshop on Modelling Uncertainty in the Financial World (MUFin21), 30th ACM International Conference on Information and Knowledge Management (CIKM2021), Gold Coast, Australia (November 2021).
	Program Committee Member for Workshop on Business Analytics, Sabanci University, Istanbul, Turkey (April 2019).
	Program Committee Member for International Conference on Computational Social Science (IC2S2 2020), Cambridge, MA, USA (July 2020).

PROFESSIONAL AFFILIATIONS	**Marketing Science Institute (MSI)**	*July 2021 - Present*
	Institute for Operations Research & the Management Sciences INFORMS	*March 2018 - Present*
	Institute of Electrical and Electronics Engineers (IEEE)	*October 2022 - Present*
	National Postdoctoral Association (NPA)	*July 2021 - Present*
	Beta Gamma Sigma (BGS)	*November 2019 - Present*
	UNICEF big data initiative, Magic Box	*April 2020 - September 2021*