Fabio Miranda

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Research Interests

I am interested in developing techniques that allow for the interactive visual analysis of large-scale data, combining methods from visualization, data management, machine learning and computer graphics. I have worked closely with domain experts from different fields and the outcome of these collaborations included not only research published in leading venues, but also systems that were made available to experts in academia, industry and government agencies. My work has also received extensive coverage from different media outlets, including The New York Times, The Economist, Architectural Digest, Curbed, among others.

Education

2012 - 2018 **Ph.D. in Computer Science** — New York, NY, USA
New York University (NYU)
Advised by Professor Cláudio T. Silva, IEEE Fellow
Dissertation: "Data structures for the interactive visual analysis of urban data".

2009 - 2011 **M.S. in Computer Science** — Rio de Janeiro, RJ, Brazil
Pontifical Catholic University of Rio de Janeiro (PUC-Rio)
Advised by Professor Waldemar Celes.
Thesis: "Volume rendering of unstructured hexahedral meshes".

2005 - 2009 **B.S. in Computer Science** — Belo Horizonte, MG, Brazil
Federal University of Minas Gerais (UFMG)
Advised by Professor Luiz Chaimowicz.

Professional Experience

Oct. 2020 - present **University of Illinois at Chicago** — Chicago, IL, USA
Assistant Professor, Department of Computer Science, College of Engineering

Fall 2018 - Fall 2020 **New York University** — New York, NY, USA
Postdoctoral researcher

Summer 2016 **Argonne National Laboratory** — Lemont, IL, USA
Research intern, Mentor: Venkatram Vishwanath

Summer 2015 **IBM T.J. Watson Research Center** — Yorktown Heights, NY, USA
Research intern, Mentor: Bruce D'Amora

Summer 2014 **AT&T Research** — Middletown, NJ, USA
Research intern, Mentors: Lauro Lins and James Klosowski

Summer 2013 **Sandia National Laboratories** — Albuquerque, NM, USA
Research intern, Mentor: Patricia Crossno

2009 - 2012 **TecGraf / PUC-Rio** — Rio de Janeiro, Brazil
Research assistant, Mentor: Waldemar Celes

Awards & Honours

2023 IEEE VIS 2023 Best Paper Honorable Mention
For "ProWis: A Visual Approach for Building, Managing, and Analyzing Weather Simulation Ensembles at Runtime".

2023 SIBGRAPI 2023 Best Paper Honorable Mention
For “Visual Analytics for Profiling Land Use Changes”.

2022 National Academy of Sciences Kavli Fellow

2018 SIGMOD Best Demonstration Award
For “Interactive Visual Exploration of Spatio-Temporal Urban Data Sets Using Urbane”.

2018 Pearl Brownstein Doctoral Research Award
For doctoral research that shows the greatest promise, awarded by NYU.

2010-2012 CAPES and Petrobras Fellowships
Awarded during M.S. studies.

2006-2009 FINEP and CNPq Fellowships
Awarded during B.S. studies.

Selected Media Coverage

November 2022 A scrap metal shredder on the Southwest Side wants to renew its permit. But Pilsen residents are fighting back.
Chicago Tribune

February 2022 Escuelas y comunidades latinas en Chicago son las más afectadas por la contaminación, según estudio.
Univision Chicago

November 2017 Urban Pulse maps, analyzes use of urban spaces.
GCN

September 2017 Urban Pulse Uses Social Media Data to Show Cities in a New Light.
Architectural Digest

September 2017 New program wants to improve cities with the power of tweets and Flickr uploads.
Curbed

December 2016 Mapping the Shadows of New York City: Every Building, Every Block.
The New York Times

October 2016 Listen to the music of the traffic in the city.
The Economist

Publications

Underlined name: advised UIC student
Dashed line name: PhD advisor
∗YYYY: paper submitted after joining UIC
J: journal, C: conference / symposium, A: abstract, W: workshop

Accepted:

[J15] *2024 A Survey on Visual Analytics for 3D Urban Data
F. Miranda, T. Ortner, G. Moreira, M. Hosseini, F. Biljecki, C. T. Silva, M. Lage, N. Ferreira
Computer Graphics Forum (Accepted, to appear)
(EuroVis 2024)

[J14] *2024 Deep Umbra: City-Scale Automatic Shadow Detection using Building Height Information
K. Omar, G. Moreira, D. Hodczak, M. Hosseini, M. Lage, **F. Miranda**
IEEE Transactions on Big Data (Accepted, to appear)

[C17] *2024 The Urban Toolkit: A Grammar-based Framework for Urban Visual Analytics
G. Moreira, M. Hosseini, M.N.A. Nipu, M. Lage, N. Ferreira, **F. Miranda**
IEEE Transactions on Visualization and Computer Graphics, vol. 1, no. 1, Jan 2024
(IEEE VIS 2023)

[C16] *2024 ProWis: A Visual Approach for Building, Managing, and Analyzing Weather Simulation Ensembles at Runtime
C.V.F. de Souza, S.M. Bonnet, D. de Oliveira, M. Cataldi, **F. Miranda**, M. Lage
IEEE Transactions on Visualization and Computer Graphics, vol. 1, no. 1, Jan 2024
Best Paper Honorable Mention (IEEE VIS 2023)

[A3] *2024 e-JUST: Environmental Justice using Urban Scalable Toolkit
A. Sharma, C. Veiga, P. Li, **F. Miranda**, G. Moreira, S. Wu, M. Budhathoki, A. Tiwari, J. Wei, M. Turk, E. Makra
104th Annual Meeting of the American Meteorological Society

[C15] *2023 Visual Analytics for Profiling Land Use Changes
C. Santos, M. Hosseini, J. Rulff, **F. Miranda**, L. Wilson, C. Silva, N. Ferreira, M. Large
36th Conference on Graphics Patterns and Images (SIBGRAPI 2023)
Best Paper Honorable Mention (SIBGRAPI 2023)

[C14] *2023 Visual Analytics Using Heterogeneous Urban Data
S. Bonadia, R. Gama, D. Oliveira, **F. Miranda**, M. Lage
36th Conference on Graphics Patterns and Images (SIBGRAPI 2023)

[J13] *2023 Environmental Justice through Community-Policy Participatory Partnerships
P.A. Boda, F. Fusi, **F. Miranda**, G.M.M. Palmer, J. Flax-Hatch, M. Siciliano, A. Sambanis, L. Johnson, S. Derrible, M. Cailas
Journal of Environmental Protection, vol. 14, no. 8, pp. 616-636, Aug 2023

[J12] *2023 A Comparison of Spatiotemporal Visualizations for 3D Urban Analytics
R. Mota, M. Horga, N. Ferreira, J. D. Silva, M. Lage, L. Ceferino, U. R. Alim, E. Sharlin, **F. Miranda**
IEEE Transactions on Visualization and Computer Graphics, vol. 29, no. 1, pp. 1277-1287, Jan 2023
(IEEE VIS 2022)

[C13] *2023 Does a quieter city mean less complaints? The sounds of New York City during COVID-19 lockdown
M. Cartwright, M. Fuentes, C. Mydlarz, **F. Miranda**, J. P. Bello
The International Conference on Acoustics, Speech, & Signal Processing (ICASSP)

[J11] *2023 Mapping the Walk: A Scalable Computer Vision Approach for Generating Sidewalk Network Datasets
M. Hosseini, A. Sevtsuk, **F. Miranda**, R. M. Cesar Jr, C. T. Silva
Computers, Environment and Urban Systems
Featured on MIT Press

[A2] *2022 Interactive Visual Analysis of Urban Data: Applications in the Weather and Climate Domains
F. Miranda
American Geophysical Union Fall Meeting 2022

[A1] *2022 Mapping Sidewalk Fall Risks Using Big Data And Machine Learning
F. Miranda, M. Hosseini
Innovation in Aging (6)

[W5] *2022 Crowdsourcing and Sidewalk Data: A Preliminary Study on the Trustworthiness of OpenStreetMap Data in the US
K. Omar, G. Moreira, D. Hodczak, M. Hosseini, **F. Miranda**
ASSETS 2022 UrbanAccess Workshop

[C12] *2022 The Future of Urban Accessibility for People with Disabilities: Data Collection, Analytics, Policy, and Tools
J. Froehlich, Y. Eisenberg, M. Hosseini, **F. Miranda** et al.
The 24th International ACM SIGACCESS Conference on Computers and Accessibility (ASSETS '22)

[J10] *2022 A Comparative Study of Methods for Visualization of Probability Distributions of Geographical Data
S. Srabanti, C. V. de Souza, E. J. da Silva, M. Lage, N. Ferreira, **F. Miranda**
Multimodal Technologies and Interaction 6 (7), 53

[W4] *2022 Towards Global-Scale Crowd+AI Techniques to Map and Assess Sidewalks for People with Disabilities
M. Hosseini, M. Saugstad, **F. Miranda**, A. Sevtsuk, C. T. Silva, J. E. Froehlich
AVA: Accessibility, Vision, and Autonomy Meet (CVPR 2022 Workshop)

[J9] *2022 Near-fall detection in unexpected slips during over-ground locomotion
S. Wang, **F. Miranda**, Y. Wang, R. Rasheed, T. Bhatt
Sensors, vol. 22, no. 9, 3334

[C11] *2022 Urban Rhapsody: Large-scale Visual Exploration of Urban Soundscapes
J. Rulff, **F. Miranda**, M. Hosseini, M. Lage, M. Cartwright, G. Dove, J. P. Bello, C. Silva
Computer Graphics Forum, vol. 41, no. 3, pp. 209-2021, Jun 2022

[C10] *2022 A Tale of Two Centers: Visual Exploration of Health Disparities in Cancer Care
S. Srabanti, M. Tran, V. Achim, D. Fuller, G. Canahuate, **F. Miranda**, G.E. Marai
2022 IEEE Pacific Visualization Symposium (PacificVis)

[J8] *2022 CitySurfaces: City-scale Semantic Segmentation of Sidewalks Surfaces
M. Hosseini, **F. Miranda**, J. Lin, C. Silva
Sustainable Cities and Society

[J7] *2022 Visualizing Simulation Ensembles of Extreme Weather Events
C. V. de Souza, P. Luz, M. Cataldi, **F. Miranda**, M. Lage
Computers & Graphics, vol. 104, pp. 162-172, May 2022

[J6] 2022 UrbanRama: Navigating Cities in Virtual Reality
S. Chen, **F. Miranda**, N. Ferreira, M. Lage, H. Doraiswamy, C. Brenner, C. Defanti, M. Koutsoubis, L. Wilson, K. Perlin, C. Silva
IEEE Transactions on Visualization and Computer Graphics, vol. 28, no. 12, pp. 4685-4699, Dec 2022

[C9] *2021 Visualizing Environmental Justice Issues in Urban Areas with a Community Input Approach
J. Flax-Hatch, S. Srabanti, **F. Miranda**, A. Sambanis, M. Cailas
2nd Spatial Data Science Symposium
Featured on Univision Chicago

[C8] *2021 Sidewalk Measurements from Satellite Images: Preliminary Findings
M. Hosseini, I. B. Araujo, H. Yazdanpanah, E. Tokuda, **F. Miranda**, C. Silva, R. M. Cesar Jr
2nd Spatial Data Science Symposium

[W3] *2021 COVID-19 EnsembleVis: Visual Analysis of County-level Ensemble Forecast Models
S. Srabanti, G. E. Marai, **F. Miranda**
12th Workshop on Visual Analytics in Healthcare

[W2] *2021 Transportation Scenario Planning with Graph Neural Network
A. A. Peregrino, S. Pradhan, Z. Liu, N. Ferreira, **F. Miranda**
10th International Workshop on Urban Computing

[C7] 2020 Urban Mosaic: Visual Exploration of Streetscapes Using Large-scale Image Data
F. Miranda, M. Lage, H. Doraiswamy, M. Hosseini, G. Dove, C. T. Silva
2020 CHI Conference on Human Factors in Computing Systems

[C6] 2020 Learning Geo-Contextual Embeddings for Commuting Flow Prediction
Z. Liu, **F. Miranda**, W. Xiong, J. Yang, Q. Wang, C. T. Silva
Thirty-Fourth AAAI Conference on Artificial Intelligence

[J5] 2019 Shadow Accrual Maps: Efficient Accumulation of City-Scale Shadows over Time
F. Miranda, H. Doraiswamy, M. Lage, L. Wilson, M. Hsieh, C. T. Silva
IEEE Transactions on Visualization and Computer Graphics, vol. 25, no. 3, pp. 1559-1574, Mar 2019
Featured on The New York Times

[C5] 2018 Time Lattice: A Data Structure for the Interactive Visual Analysis of Large Time Series
F. Miranda, M. Lage, H. Doraiswamy, C. Mydlarz, J. Salamon, Y. Lockerman, J. Freire, C. T. Silva
Computer Graphics Forum, vol. 37, no. 3, pp. 23-35, Jun 2018

[C4] 2018 Interactive Visual Exploration of Spatio-Temporal Urban Data Sets using Urbane
H. Doraiswamy, E. Tzirita Zacharatou, **F. Miranda**, M. Lage, A. Ailamaki, C. T. Silva, J. Freire
2018 ACM SIGMOD Intl. Conf. on Management of Data - Demo
Best Demonstration Award

[J4] 2018 Spatio-Temporal Urban Data Analysis: A Visual Analytics Perspective
H. Doraiswamy, J. Freire, M. Lage, **F. Miranda**, C. T. Silva
IEEE Computer Graphics and Application, vol. 38, no. 5, pp. 26-35, Sept/Oct 2018

[J3] 2018 TopKube: A Rank-Aware Data Cube for Real-Time Exploration of Spatiotemporal Datasets
F. Miranda, L. Lins, J. Klosowski, C. T. Silva
IEEE Transactions on Visualization and Computer Graphics, vol. 24, no. 3, pp. 1394-1407, Mar 2018

[J2] 2017 Urban Pulse: Capturing the Rhythm of Cities
F. Miranda, H. Doraiswamy, M. Lage, K. Zao, B. Goncalves, L. Wilson, M. Hsieh, C. T. Silva
IEEE Transactions on Visualization and Computer Graphics, vol. 23, no. 1, pp. 791-800, Jan 2017
Featured on The Economist, invited to SIGGRAPH 2017 TVCG special session

[C3] 2017 Data Visualization Tool for Monitoring Transit Operation and Performance
A. Kurkcu, **F. Miranda**, K. Ozbay, C. T. Silva
5th IEEE Intl. Conf. on Models and Technologies for Intelligent Transportation Systems (2017)

[W1] 2016 TopKube: A Rank-Aware Data Cube for Real-Time Exploration of Spatiotemporal Datasets
F. Miranda, L. Lins, J. Klosowski, C. T. Silva
Data Systems for Interactive Analysis (DSIA) 2016

[J1] 2012 Volume Rendering of Unstructured Hexahedral Meshes
F. Miranda, and W. Celes
The Visual Computer Journal, vol. 28, no. 10, pp. 1005-1014, Oct 2012

[C2] 2011 Accurate Volume Rendering of Unstructured Hexahedral Meshes
F. Miranda, and W. Celes
24th Sibgrapi Conference on Graphics, Patterns and Images (2011)

[C1] 2011 Illustrative Volume Visualization for Unstructured Meshes Based on Photic Extremum Lines
A. Rocha, **F. Miranda**, and W. Celes
24th Sibgrapi Conference on Graphics, Patterns and Images (2011)

External Grants

Accepted:

Fall 2023 - Fall 2026 **Research Infrastructure: MRI: Track 2 Acquisition of Data Observation and Computation Collaboratory (DOCC)** — NSF (Major Research Instrumentation Program)
Role: Co-PI
Total and UIC's share: $1,548,545. Miranda's share: $154,854 (10% of UIC's share)

Fall 2023 - Fall 2028 **Clean Energy and Equitable Transportation Solutions (CLEETS)** NSF (US-UK Global Centers)

Role: SP
PI: Ashish Sharma (Discovery Partner Institute, UI). UIC PI: Venkat Venkatakrishnan (Discovery Partner Institute, UI)
Total: $5,000,000. UIC's share: $1,181,443. Miranda's share: $177,216 (15% of UIC's share)

Fall 2023 - Fall 2025 **Impact Measurement for At-Grade Crossings Analysis and Prioritization** IDOT

Role: PI
Total: $205,000. UIC's share: $41,000. Miranda's share: $41,000 (100% of UIC's share).

Fall 2022 - Fall 2023 **Data readiness for 'Perturbation training for enhancing stability and limb support control for fall-risk reduction among stroke survivors'** NIH

Role: Co-I
PI: Tanvi Bhatt (Dept. of Physical Therapy, UIC)
Total and UIC's share: $308,918. Miranda's share: $30,000 (10% of UIC's share).

Internal Grants

Fall 2022 - Fall 2023 **PRESUR: Planning a Resilient and Equitable State Using Real-time Data** DPI

Role: Co-PI
PI: Sybil Derrible (Dept. of Civil, Materials and Environmental Engineering, UIC)
UIC's share: $125,000. Miranda's share: $32,000 (25%).

Teaching

Fall 2023 **CS424: Visualization & Visual Analytics (Students: 90)** UIC

Graduate session (n=39): Overall teaching effectiveness: 4.7; Overall quality of the course: 4.73
Undergraduate session (n=40): Overall teaching effectiveness: 4.28; Overall quality of the course: 4.18
Course page

Spring 2023 **CS524: Big Data Visualization & Visual Analytics (Students: 38)** UIC

Graduate session (n=35): Overall teaching effectiveness: 4.63; Overall quality of the course: 4.54
Course page

Fall 2022 **CS424: Visualization & Visual Analytics (Students: 50)** UIC

Graduate session (n=19): Overall teaching effectiveness: 4.63; Overall quality of the course: 4.58
Undergraduate session (n=22): Overall teaching effectiveness: 4.36; Overall quality of the course: 4.45
Course page

Spring 2022 **CS425: Computer Graphics I (Students: 49)** UIC

Graduate session (n=6). Overall teaching effectiveness: 4.67; Overall quality of the course: 4.67
Undergraduate session (n=31). Overall teaching effectiveness: 3.97; Overall quality of the course: 3.9
Course page

Fall 2021 **CS594: Big Data Visualization & Analytics (Students: 29)** UIC

Graduate session (n=25). Overall teaching effectiveness: 4.4; Overall quality of the course: 4.36
Course page

Spring 2021 **CS425: Computer Graphics I (Students: 41)** UIC

Graduate and undergraduate sessions (n=33): Overall teaching effectiveness: 4.03; Overall quality of the course: 4.03
Course page

Advised Students

2021 -	**Ph.D. students (advisor)** Leonardo Ferreira, Gustavo Moreira, Kazi Omar, Stefan Cobeli, Sanjana Srabanti (co-adivising with G. Elisabeta Marai)	UIC
2021 -	**M.Sc. students (advisor)** Davide Bartoletti, Sajal Chandra	UIC
2021 -	**Undergraduate students (advisor)** Daniel Hodczak, Jayanth Podapati, Reem Sheikh, Rahiya Rasheed	UIC
2018 - 2020	**Ph.D. students (mentor)** Zhicheng Liu (CS PhD student at Southeast University, China), Maryam Hosseini (Urban Systems PhD student at Rutgers), Shaoyu Chen (CS PhD student at NYU), João Rulff (CS PhD student at NYU).	NYU

Selected Invited Talks and Presentations

March 2024	**Interactive Urban Visual Analysis at Scale: From Data to Actionable Insights** US Census Bureau	Online
March 2023	**Interactive Urban Visual Analysis at Scale: From Data to Actionable Insights** Visiting lecturer Fluminense Federal University	Niteroi, RJ, Brazil
December 2022	**Interactive Visual Analysis of Urban Data: Applications in the Weather and Climate Domains** AGU Fall Meeting 2022 American Geophysical Union	Chicago, IL, USA
November 2022	**Mapping Sidewalk Fall Risks Using Big Data and Machine Learning** GSA 2022 Annual Scientific Meeting Gerontological Society of America	Indianapolis, IN, USA
October 2022	**Interactive Visual Analysis at Scale: From Data to Actionable Insights** Keynote speaker SIBGRAPI 2022	Natal, RN, Brazil
October 2022	**Visualizing Environmental Justice Issues in Urban Areas with a Community-based Approach** Keynote speaker Visualization for Social Good (VIS4SG) workshop	Natal, RN, Brazil
July 2022	**Interactive Visual Analysis of Urban Data: Immersive Analytics Opportunities** Kavli Frontiers of Science Symposium National Academy of Science	Davis, CA, USA
April 2022	**Interactive Visual Analysis of Urban Data: Immersive Analytics Opportunities** The Next Evolution: XR & AEC VRAR CHICAGO	Online
January 2022	**Interactive Visual Analysis of Urban Data: Beyond Flatland** Urban Initiative Program New York University	Online

April 2021	**Interactive Visual Analysis of Urban Data: Beyond Flatland** Department of Energy Computer Graphics Forum 2021 Department of Energy	Online
April 2021	**Interactive Visual Analysis of Urban Data: A Computational Perspective on Cities** Federal University of Rio Grande do Sul	Porto Alegre, RS, Brazil
March 2021	**Interactive Visual Analysis of Urban Data: A Computational Perspective on Cities** Fluminense Federal University	Niteroi, RJ, Brazil
December 2018	**Exploration of Street-Level Images at Scale** Pedestrian Movement Technology Showcase at Metro North	New York City, NY, USA
November 2018	**Shadow Accrual Maps: Efficient Accumulation of City-Scale Shadows over Time** IEEE Visualization Conference (VIS)	Berlin, Germany
June 2018	**Time Lattice: A Data Structure for the Interactive Visual Analysis of Large Time Series** EG/VGTC Conference on Visualization (EuroVis)	Brno, Czech Republic
October 2017	**TopKube: A Rank-Aware Data Cube for Real-Time Exploration of Spatiotemporal Datasets** IEEE Visualization Conference (VIS)	Phoenix, AZ, USA
September 2016	**Visualizing and Exploring Urban Data** Data Visualization Summit	Boston, MA, USA
October 2016	**TopKube: A Rank-Aware Data Cube for Real-Time Exploration of Spatiotemporal Datasets** Data Systems for Interactive Analysis Workshop (DSIA)	Chicago, IL, USA

Academic Services

Program chair

• SIBGRAPI (2022)

Conference and workshop organization

• 1st Workshop on The Future of Urban Accessibility at ASSETS'22
• VIS 2021, Local co-chair (2021)
• The Future of Global-Scale Spatial Data Collection and Analyses on Urban (in)Accessibility for People with Disabilities Workshop, Co-chair (2021)

Program committees

• IEEE VIS Full papers (2022, 2023, 2024) • IEEE VIS Short papers (2019, 2020, 2021, 2023)
• EuroVis (2022, 2023) • Visualization and Data Analysis Conference (2022) • SIBGRAPI (2019, 2020, 2021, 2023)

Editor

• Computers & Graphics (SIBGRAPI 2022 Special Issue)

Grant reviewer

• NSF reviewer (2022, 2022, 2024)
• Center for Transportation, Equity, Decisions and Dollars reviewer (2022) • Discovery Partners Institute reviewer (2021)

Journal reviewer

● IEEE Trans. on Visualization and Computer Graphics (2020, 2021, 2022, 2023) ● IEEE Trans. on Big Data (2020)

● IEEE Trans. on Intelligent Transportation Systems (2021) ● The Visual Computer Journal (2019, 2020, 2021, 2022) ● Transportation Research Record Journal (2020) ● International Journal of Geo-Information (2021)

Conference reviewer

● IEEE VIS (2020, 2021, 2022) ● EuroVis (2019, 2020, 2021, 2022) ● Sibgrapi (2019, 2020, 2021, 2022)

● VLDB (2021) ● WWW (2021) ● International Conference on Pattern Recognition (2020, 2021, 2022)

PhD & MSc committees

PhD committees

●Emily Muller (ICL, 2023) ● Andrew Wentzel (2023) ● Carolina Veiga (UFF, 2022) ● Shaoyu Chen (NYU, 2022)

Master's project committees

●Parikshit Solunke (2021) ● Pavana Doddi (2021)

WCP committees

Stefan Cobeli (2023) ● Kazi Omar (2023) ● Carla Floricel (2021) ● Md Nafiul Alam Nipu (2021) ● Andrew Wentzel (2021) ● Muhammad Abdul Wahhab (2021)

University services

Department committees

● Graduate Committee (2023-2024)

● Faculty Search Committee (2021-2022, 2022-2023)

● Graduate Admission Committee (2020-2021)

Reviewer

● Provost's Graduate Research Award reviewer (2020)

Professional Memberships

Association for Computing Machinery (ACM)
Brazilian Computer Society (Sociedade Brasileira de Computação, SBC)