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

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

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
∗YYYY: paper submitted after joining UIC

Under review:

∗2022 A Comparison of Spatiotemporal Visualizations for 3D Urban Analytics
R. Mota, N. Ferreira, J. D. Silva, M. Horga, M. Lage, L. Ceferino, U. R. Alim, E. Sharlin, **F. Miranda**
IEEE VIS 2022 (under review)

∗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**
The Visual Computer Journal

Accepted:

∗2022 Near-fall detection in unexpected slips during over-ground locomotion
S. Wang, **F. Miranda**, Y. Wang, R. Rasheed, T. Bhatt
Sensors (major revision)

∗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 (accepted)

∗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)

∗2022 CitySurfaces: City-scale Semantic Segmentation of Sidewalks Surfaces
M. Hosseini, **F. Miranda**, J. Lin, C. Silva
Sustainable Cities and Society (accepted)

*2022 Visualizing Simulation Ensembles of Extreme Weather Events
C. V. de Souza, P. Luz, M. Cataldi, **F. Miranda**, M. Lage
Computers & Graphics (accepted)

*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

*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

*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

*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

2021 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 (accepted)

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.

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.

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

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.

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

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.

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.

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

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).

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.

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.

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

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).

Funding

Fall 2022 - Fall 2023 **PRESUR: Planning a Resilient and Equitable State Using Real-time Data** — Discovery Partners Institute
Co-PI, $125,000 (direct total)

Teaching

Spring 2022 **CS425: Computer Graphics I** — University of Illinois at Chicago
Undergraduate course. No. of students enrolled: 49.
Course page

Fall 2021 **CS594: Big Data Visualization & Analytics** — University of Illinois at Chicago
Graduate course. No. of students enrolled: 29.
Average student evaluation score: 4.4 / 5.0 (n=25, std. dev.=0.76)
Course page

Spring 2021 **CS425: Computer Graphics I** — University of Illinois at Chicago
Undergraduate course. No. of students enrolled: 41.
Average student evaluation score: 4.03 / 5.0 (n=33, std. dev.=0.98)
Course page

Advised Students

2021 - **Ph.D. students (advisor)** — University of Illinois at Chicago
Kazi Omar, Marius Horga, Sanjana Srabanti (co-adivising with G. Elisabeta Marai)

2021 - **M.Sc. students (advisor)** — University of Illinois at Chicago
Soham Pradhan

2021 - **Undergraduate students (advisor)** — University of Illinois at Chicago
Daniel Hodczak, Jayanth Podapati, Reem Sheikh, Rahiya Rasheed

2018 -	**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).	New York University

Selected Invited Talks and Presentations

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
February 2020	**Interactive Visual Analysis at Scale: From Data to Actionable Insights** Tulane University	New Orleans, LA, USA
January 2020	**Interactive Visual Analysis at Scale: From Data to Actionable Insights** Portland State University	Portland, OR, USA
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

• 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) • IEEE VIS Short papers (2019, 2020, 2021)

• EuroVis (2022) • Visualization and Data Analysis Conference (2022) • SIBGRAPI (2019, 2020, 2021)

Editor

• Computers & Graphics (SIBGRAPI 2022 Special Issue)

Grant reviewer

• NSF reviewer (GRFP, 2022), (CSSI, 2022)

• 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) • 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 (2018, 2019, 2020, 2021) • Sibgrapi (2018, 2019, 2020, 2021)

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

University Services

Department committees

• Faculty Search Committee (2022)

• Graduate Admission Committee (2020, 2021)

Reviewer

• Provost's Graduate Research Award reviewer (2020)

WCP committees

• Carla Floricel (2021) • Md Nafiul Alam Nipu (2021) • Andrew Wentzel (2021) • Muhammad Abdul Wahhab (2021)

Master's project committees

•Parikshit Solunke (2021) • Pavana Doddi (2021)

Professional Memberships

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