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 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
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
Federal University of Minas Gerais (UFMG)
Advised by Professor Luiz Chaimowicz.

Professional Experience

Oct. 2020 - present University of Illinois at Chicago
Assistant Professor, Department of Computer Science, College of Engineering
Fall 2018 - Fall 2020 New York University
Postdoctoral researcher
Summer 2016 Argonne National Laboratory
Research intern, Mentor: Venkatram Vishwanath
Summer 2015 IBM T.J. Watson Research Center
Research intern, Mentor: Bruce D’Amora
Summer 2014 AT&T Research
Research intern, Mentors: Lauro Lins and James Klosowski
Summer 2013 Sandia National Laboratories
Research intern, Mentor: Patricia Crossno
2009 - 2012 TecGraf / PUC-Rio
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:

[J] *2022  DeepShadow: 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

[J] *2022  Putting the Environment back in “Environmental Justice”: A Two-Dimensional Approach for Area Identification
M. Becerra, J. Liang, M. Siciliano, F. Fusi, F. Miranda, A. Sambanis, P. Boda, S. Derrible, M. Callas
Environmental Justice journal

[J] *2022  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

Accepted:

[C] *2022  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 VIS 2022

[C] *2022  Towards Global-Scale Crowd+AI Techniques to Map and Assess Sidewalks for People with Disabilities
J. Froehlich, Y. Eisenberg, M. Hosseini, F. Miranda et al.
The 24th International ACM SIGACCESS Conference on Computers and Accessibility (ASSETS ’22)

[J] *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
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)

Near-fall detection in unexpected slips during over-ground locomotion
S. Wang, F. Miranda, Y. Wang, R. Rasheed, T. Bhatt
Sensors

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

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)

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

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

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

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

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

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

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)

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.

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.

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
| Year | Title                                                                 | Authors                                                                 | Proceedings                                                                 |
|------|----------------------------------------------------------------------|------------------------------------------------------------------------|----------------------------------------------------------------------------|
| 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**

| Year | Project Description                                                                 | Funding Agency               |
|------|-------------------------------------------------------------------------------------|------------------------------|
| 2022-2023 | Data readiness for 'Perturbation training for enhancing stability and limb support control for fall-risk reduction among stroke survivors’ | National Institute of Health |
|        | Co-I, $300,000 (total)                                                             |                              |
|        | PI: Tanvi Bhatt (UIC)                                                              |                              |
| 2022-2023 | PRESUR: Planning a Resilient and Equitable State Using Real-time Data             | Discovery Partners Institute |
|        | Co-PI, $125,000 (direct total)                                                      |                              |
|        | PI: Sybil Derrible (UIC)                                                            |                              |
Teaching

Spring 2022  **CS425: Computer Graphics I**  
Undergraduate course. No. of students enrolled: 49.  
Average student evaluation score: 4.08 / 5.0 (n=37)  
Course page

Fall 2021  **CS594: Big Data Visualization & Analytics**  
Graduate course. No. of students enrolled: 29.  
Average student evaluation score: 4.4 / 5.0 (n=25)  
Course page

Spring 2021  **CS425: Computer Graphics I**  
Undergraduate course. No. of students enrolled: 41.  
Average student evaluation score: 4.03 / 5.0 (n=33)  
Course page

Advised Students

2021 -  **Ph.D. students (advisor)**  
Gustavo Moreira, Kazi Omar, Marius Horga, Sanjana Srabanti (co-advising with G. Elisabetta Marai)

2021 -  **M.Sc. students (advisor)**  
Davide Bartoletti, Soham Pradhan

2021 -  **Undergraduate students (advisor)**  
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).

Selected Invited Talks and Presentations

July 2022  **Interactive Visual Analysis of Urban Data: Immersive Analytics Opportunities**  
Kavli Frontiers of Science Symposium  
National Academy of Science

April 2022  **Interactive Visual Analysis of Urban Data: Immersive Analytics Opportunities**  
The Next Evolution: XR & AEC  
VRAR CHICAGO

January 2022  **Interactive Visual Analysis of Urban Data: Beyond Flatland**  
Urban Initiative Program  
New York University

April 2021  **Interactive Visual Analysis of Urban Data: Beyond Flatland**  
Department of Energy Computer Graphics Forum 2021  
Department of Energy
April 2021  Interactive Visual Analysis of Urban Data: A Computational Perspective on Cities  Porto Alegre, RS, Brazil
Federal University of Rio Grande do Sul

March 2021  Interactive Visual Analysis of Urban Data: A Computational Perspective on Cities  Niteroi, RJ, Brazil
Fluminense Federal University

December 2018 Exploration of Street-Level Images at Scale  New York City, NY, USA
Pedestrian Movement Technology Showcase at Metro North

November 2018 Shadow Accrual Maps: Efficient Accumulation of City-Scale Shadows over Time  Berlin, Germany
IEEE Visualization Conference (VIS)

June 2018 Time Lattice: A Data Structure for the Interactive Visual Analysis of Large Time Series  Brno, Czech Republic
EG/ VGTC Conference on Visualization (EuroVis)

October 2017 TopKube: A Rank-Aware Data Cube for Real-Time Exploration of Spatiotemporal Datasets  Phoenix, AZ, USA
IEEE Visualization Conference (VIS)

September 2016 Visualizing and Exploring Urban Data  Boston, MA, USA
Data Visualization Summit

October 2016 TopKube: A Rank-Aware Data Cube for Real-Time Exploration of Spatiotemporal Datasets  Chicago, IL, USA
Data Systems for Interactive Analysis Workshop (DSIA)

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) • 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 (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)

University Services

Department committees
• Faculty Search Committee (2021-2022, 2022-2023)
• 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).