

Fabio Miranda

ASSISTANT PROFESSOR, DEPARTMENT OF COMPUTER SCIENCE, COLLEGE OF ENGINEERING

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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.

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

Fall 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

Development of new techniques for the interactive visualization of different types of large-scale data, such as streaming timeseries data and image data. Also responsible for mentoring PhD students.

Summer 2016

Argonne National Laboratory

Lemont, IL, USA

Research intern

Mentor: Venkatram Vishwanath

Developed a visualization tool to explore high-resolution volumetric weather simulations, focused in the Chicago metropolitan area, in order to understand the impact of built environment on the city climate.

Summer 2015

IBM T.J. Watson Research Center

Yorktown Heights, NY, USA

Research intern

Mentor: Bruce D'Amora

Developed a web-based graph visualization tool for the exploratory visualization of bitcoin transactions.

Summer 2014

AT&T Research

Middletown, NJ, USA

Research intern

Mentors: Lauro Lins and James Klosowski

Developed a distributed version of *Nanocubes*, a datacube-based approach for the visualization of massive spatiotemporal datasets.

Summer 2013

Sandia National Laboratories

Albuquerque, NM, USA

Research intern

Mentor: Patricia Crossno

Developed an adaptive kernel density estimation approach for scatterplots using GPUs.

2009 - 2012

TecGraf / PUC-Rio

Rio de Janeiro, Brazil

Research assistant

Mentor: Waldemar Celes

Developed an unstructured hexahedral volume renderer for a data visualization and analysis software used in most of Brazil's oil fields.

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

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

2022

CitySurfaces: City-scale Semantic Segmentation of Sidewalks Surfaces

M. Hosseini, **F. Miranda**, J. Lin, C. Silva

Sustainable Cities and Society (minor revision)

Visualizing Simulation Ensembles of Extreme Weather Events

C. V. de Souza, P. Luz, M. Cataldi, **F. Miranda**, M. Lage

Computers & Graphics (minor revision)

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

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, to appear)
- 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.
- 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.
- 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
- 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.
- 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
- 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).

Illustrative Volume Visualization for Unstructured Meshes Based on Photoc Extremum Lines

A. Rocha, **F. Miranda**, and W. Celes

24th Sibgrapi Conference on Graphics, Patterns and Images (2011).

Funding

Fall 2021

PRESUR: Planning a Resilient and Equitable State Using Real-time Data

Discovery Partners Institute

Co-PI, \$125,000 (total)

Teaching Experience

Fall 2021

CS594: Big Data Visualization & Analytics

University of Illinois at Chicago

Graduate course.

Course page [↗](#)

Spring 2021

CS425: Computer Graphics I

University of Illinois at Chicago

Undergraduate course.

Course page [↗](#)

Fall 2019

CS GY 6533: Interactive Computer Graphics

New York University

Graduate course. Prepared and presented 2.5 hour lecture on shadows.

Fall 2014

CS UY 1133: Data Structures and Algorithms

New York University

Undergraduate course. Prepared and presented 2.5 hour lecture on C and C++ programming.

Fall 2014

CUSP GX 5003: Principles of Urban Informatics

New York University

Teaching assistant for Cláudio T. Silva, 50 students

Graduate course. Prepared and presented lectures on visualization, python, pandas and MySQL. Created and graded assignments, and held office hours.

Fall 2013

CUSP GX 5003: Principles of Urban Informatics

New York University

Teaching assistant for Cláudio T. Silva, 50 students

Graduate course. Developed and presented lectures on visualization, python, javascript, D3 and MySQL. Prepared and graded assignments, and held office hours.

Advised Students

2021 -

Ph.D. students (adviser)

University of Illinois at Chicago

Kazi Omar, Marius Horga, Sanjana Srabanti (co-advising with G. Elisabeta Marai)

2021 -

M.Sc. students (adviser)

University of Illinois at Chicago

Soham Pradhan

2021 -

Undergraduate students (adviser)

University of Illinois at Chicago

Daniel Hodczak, Jayanth Podapati

2018 -

Ph.D. students (mentor)

New York University

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).

Invited Talks and Presentations

April 2021

Interactive Visual Analysis of Urban Data: Beyond Flatland

Online

Department of Energy Computer Graphics Forum 2021

Department of Energy

<i>April 2021</i>	Interactive Visual Analysis of Urban Data: A Computational Perspective on Cities Federal University of Rio Grande do Sul	<i>Porto Alegre, RS, Brazil</i>
<i>March 2021</i>	Interactive Visual Analysis of Urban Data: A Computational Perspective on Cities Fluminense Federal University	<i>Niteroi, RJ, Brazil</i>
<i>February 2020</i>	Interactive Visual Analysis at Scale: From Data to Actionable Insights University of Illinois at Chicago	<i>Chicago, CA, USA</i>
<i>February 2020</i>	Interactive Visual Analysis at Scale: From Data to Actionable Insights Illinois Institute of Technology	<i>Chicago, IL, USA</i>
<i>February 2020</i>	Interactive Visual Analysis at Scale: From Data to Actionable Insights San Diego State University	<i>San Diego, CA, USA</i>
<i>February 2020</i>	Interactive Visual Analysis at Scale: From Data to Actionable Insights Tulane University	<i>New Orleans, LA, USA</i>
<i>February 2020</i>	Interactive Visual Analysis at Scale: From Data to Actionable Insights The University of New Orleans	<i>New Orleans, LA, USA</i>
<i>January 2020</i>	Interactive Visual Analysis at Scale: From Data to Actionable Insights Portland State University	<i>Portland, OR, USA</i>
<i>January 2020</i>	Interactive Visual Analysis at Scale: From Data to Actionable Insights Virginia Commonwealth University	<i>Richmond, VA, USA</i>
<i>January 2020</i>	Interactive Visual Analysis at Scale: From Data to Actionable Insights University of Massachusetts - Dartmouth	<i>Dartmouth, MA, USA</i>
<i>December 2018</i>	Exploration of Street-Level Images at Scale Pedestrian Movement Technology Showcase at Metro North	<i>New York City, NY, USA</i>
<i>November 2018</i>	Shadow Accrual Maps: Efficient Accumulation of City-Scale Shadows over Time IEEE Visualization Conference (VIS)	<i>Berlin, Germany</i>
<i>June 2018</i>	Time Lattice: A Data Structure for the Interactive Visual Analysis of Large Time Series EG/VGTC Conference on Visualization (EuroVis)	<i>Brno, Czech Republic</i>
<i>October 2017</i>	TopKube: A Rank-Aware Data Cube for Real-Time Exploration of Spatiotemporal Datasets IEEE Visualization Conference (VIS)	<i>Phoenix, AZ, USA</i>
<i>September 2016</i>	Visualizing and Exploring Urban Data Data Visualization Summit	<i>Boston, MA, USA</i>
<i>October 2016</i>	TopKube: A Rank-Aware Data Cube for Real-Time Exploration of Spatiotemporal Datasets Data Systems for Interactive Analysis Workshop (DSIA)	<i>Chicago, IL, USA</i>

Accurate Volume Rendering of Unstructured Hexahedral Meshes

Sibgrapi Conference on Graphics, Patterns and Images

Selected Open-Source Projects

- 2019 New York City Shadow Data
Shadow data for New York City, also used by The New York Times. [↗](#)
- 2018 Urban Pulse
Open-source version of Urban Pulse paper. [↗](#)
- 2017 Bus Explorer
Open-source tool for the exploration of a large data set with bus tracking pings. Developed in close collaboration with the New York City Department of Transportation. [↗](#)

Professional Services

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

EuroVis (2022)

Visualization and Data Analysis Conference (2022)

Sibgrapi (2019, 2020, 2021)

IEEE VIS Short papers (2019, 2020, 2021)

Grant reviewer

NSF Reviewer (2022)

Discovery Partners Institute grant reviewer (2021)

Journal reviewer

IEEE Transactions on Visualization and Computer Graphics

IEEE Transactions on Big Data

IEEE Transactions on Intelligent Transportation Systems

The Visual Computer Journal

Transportation Research Record Journal

International Journal of Geo-Information

International Conference on Pattern Recognition

Conference reviewer

IEEE VIS (2018, 2019, 2020, 2021)

Sibgrapi (2018, 2019, 2020, 2021)

VLDB (2021)

WWW (2021)

University Services

Departmental 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)

Parikshit Solunke (2021), Pavana Doddi (2021)

Professional Memberships

Association for Computing Machinery (ACM).

Brazilian Computer Society (Sociedade Brasileira de Computação, SBC).