

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 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 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 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

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, 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 Photic Extremum Lines
A. Rocha, **F. Miranda**, and W. Celes
24th Sibgrapi Conference on Graphics, Patterns and Images (2011).

Teaching Experience

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| Spring 2021 | CS425: Computer Graphics I
Undergraduate course. | University of Illinois at Chicago |
| Fall 2019 | CS GY 6533: Interactive Computer Graphics
Graduate course. Prepared and presented 2.5 hour lecture on shadows. | New York University |
| Fall 2014 | CS UY 1133: Data Structures and Algorithms
Undergraduate course. Prepared and presented 2.5 hour lecture on C and C++ programming. | New York University |
| Fall 2014 | CUSP GX 5003: Principles of Urban Informatics
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. | New York University |

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.

Mentoring Experience

2018 -

Mentor Ph.D. Students

New York University

Mentor students to work with the Urbane framework, as well as on research projects.

Students: 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

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

February 2020

Interactive Visual Analysis at Scale: From Data to Actionable Insights

Chicago, CA, USA

University of Illinois at Chicago

February 2020

Interactive Visual Analysis at Scale: From Data to Actionable Insights

Chicago, IL, USA

Illinois Institute of Technology

February 2020

Interactive Visual Analysis at Scale: From Data to Actionable Insights

San Diego, CA, USA

San Diego State University

February 2020

Interactive Visual Analysis at Scale: From Data to Actionable Insights

New Orleans, LA, USA

Tulane University

February 2020

Interactive Visual Analysis at Scale: From Data to Actionable Insights

New Orleans, LA, USA

The University of New Orleans

January 2020

Interactive Visual Analysis at Scale: From Data to Actionable Insights

Portland, OR, USA

Portland State University

January 2020

Interactive Visual Analysis at Scale: From Data to Actionable Insights

Richmond, VA, USA

Virginia Commonwealth University

January 2020

Interactive Visual Analysis at Scale: From Data to Actionable Insights

Dartmouth, MA, USA

University of Massachusetts - Dartmouth

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
October 2011	Accurate Volume Rendering of Unstructured Hexahedral Meshes Sibgrapi Conference on Graphics, Patterns and Images	Maceió, Brazil

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 Service

Program Committees: Sibgrapi (2019, 2020, 2021), IEEE VIS Short papers (2019, 2020, 2021).
Reviewer: VLDB, IEEE Transactions on Visualization and Computer Graphics, IEEE Transactions on Big Data, IEEE InfoVis, IEEE SciVis, IEEE VAST, Sibgrapi, WWW, The Visual Computer Journal, Transportation Research Record Journal, International Journal of Geo-Information, International Conference on Pattern Recognition.

University Service

Discovery Partners Institute grant reviewer (2021).
Written Critique and Presentation 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)
Graduate Admission Committee (2020, 2021).
Provost's Graduate Research Award reviewer (2020).

Outreach Activities

Chicago Area Undergraduate Research Symposium judge (2021).

Professional Memberships

Association for Computing Machinery (ACM).

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