

Diego Da Silva, PhD

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in /diegosilva

Education

PhD in Computer Science - Scientific and Applied Computing

Federal University of ABC (UFABC)

Santo Andre, SP, Brazil

2016 - 2021

- Dissertation: *A Method for Finding Factors Affecting the Service Reliability on Fixed Bus Routes* (Supervisor: Dr. Raphael Yokoingawa de Camargo/Center for Mathematics, Computing and Cognition).

International Visiting Graduate Student

University of Toronto

Toronto, ON, Canada

2019 - 2021

Diploma in Industrial Management

Polytechnic School of the University of Sao Paulo (USP)

Sao Paulo, SP, Brazil

2007 - 2009

BSc Science & Technology

Federal University of ABC (UFABC)

Santo Andre, SP, Brazil

2007 - 2012

BSc Civil Construction

Sao Paulo State University (Unesp/Fatec-SP)

Sao Paulo, SP, Brazil

2002 - 2006

Academic Employment

Postdoctoral Fellow

University of Toronto/Transit Analytics Lab

Toronto, ON, Canada

April 2021 - Present

- Working to benchmark, simulate, model, optimize and analyze urban transit systems, including reliability and decision-making processes.
- Using machine learning methods to analyze the impact of electric buses on transit planning and operation.
- Advanced time series models for forecasting demand and estimating Origin-Destination matrix using Toronto subway Wi-Fi data.
- Writing proposals for research partnership funding for federal government agencies and private companies, securing resources for innovative transit research and development projects.
- Organizing and supported events such as symposiums, research days, and conferences, fostering collaboration and knowledge exchange among academics, industry professionals, and policymakers.
- Leading the research delivery on Generative Design of Integrated Transportation Networks in the iCity 2.0 Project. This initiative aims to bring together academia, government, and industry to collaborate on Urban Data Science for Future Mobility. Our objective is to develop a new capability that employs generative design to discover the most effective surface transit service and network solutions, and identify optimal strategies for improving them in an Ontario case study. The Principal Investigator is Dr. Eric J. Miller. Ontario Research Fund: 4,000,000 CAD
- Evaluating the application of an On-Demand Transit (ODT) planning and assessment framework in collaboration with MiWay Transit - Mississauga.

Teaching Experience

Analytics for Transit and Mobility Networks (CIV1507)

University of Toronto

Toronto, ON, Canada

Summer 2024

- Developed and taught a unique graduate-level course that brings the most advanced techniques applied in public transit, including AI models and advanced time series analysis. The course emphasizes data analysis, modeling, and visualization principles, with applications in transit reliability, equity and access to opportunities, demand forecasting, and real-time data analysis. The course received positive student evaluations, scoring 4.5 out of 5 in 2024. This score exceeded the department average of 4.2 and the Applied Sciences and Engineering division average of 4.3 for the same year.

Research Contracts

Getulio Vargas Foundation (FGV)

Transit Network Redesign

Toronto, ON, Canada

May 2024 - Present

- Supporting strategic technical decision-making in Intelligent Transport Systems and advanced data analysis. Responsibilities include updating and restructuring the metropolitan network modeling and public passenger transport systems for the Porto Alegre Metropolitan Region. A key goal is to develop a comprehensive bid for implementing these technological improvements. This \$1M USD project is led by Principal Investigator Dr. Ciro Biderman under Contract SECON N° 22343/2023.

Getulio Vargas Foundation (FGV)

Automated Fare Collection and ABT System Design

Toronto, ON, Canada

May 2023 - Present

- Designed the technical and functional architecture for transitioning from a closed-loop to an open-loop payment system with Account-Based Ticketing (ABT) services for EPTC in Porto Alegre, Brazil. This \$390K USD project, led by Principal Investigator Dr. Ciro Biderman under Contract SECON N° 82352/2023, aimed to modernize fare collection systems and enhance passenger experience.

Getulio Vargas Foundation (FGV)

Big Data for Sustainable Urban Development

Toronto, ON, Canada

March 2021 - August 2021

- Collaborated with the Getulio Vargas Foundation (FGV-Brazil), Inter-American Development Bank (IDB), and Waze to develop a city-to-street-level congestion indicator. Designed and implemented a real-time traffic monitoring dashboard for São Paulo (Brazil), Montevideo (Uruguay), Quito (Ecuador), Xalapa (Mexico), and Miraflores (Peru). This initiative was part of the "Big Data for Sustainable Urban Development" project, led by Principal Investigator Dr. Ciro Biderman, to enhance urban mobility and decision-making through advanced data analytics.

TransitCenter

TransitCenter Equity Dashboard

Toronto, ON, Canada

March 2020 - February 2021

- Contributed to a \$100K USD project led by Prof. Alex Karner, focusing on comprehensive transit access and equity analysis across seven U.S. major urban areas. Led the technical development and created a Python-based Fare Calculator system, a key component of the transit access score calculation, to support equity-focused transit planning.

Academic Contributions

Peer-Reviewed Journal Publications

- A1 **Da Silva, D.**, Klumpenhouwer, W., Karner, A., Robinson, M., Liu, R., and Shalaby, A. (2022). Living on a Fare: Modeling and Quantifying the Effects of Fare Budgets on Accessibility and Equity. *Journal of Transport Geography* 101, p. 103348.
- A2 Klumpenhouwer, W., Allen, J., Li, L., Liu, R., Robinson, M., **Da Silva, D.**, Farber, S., Karner, A., Rowangould, D., Shalaby, A., Buchanan, M., and Higashide, S. (2021). A Comprehensive Transit Accessibility and Equity Dashboard. *Findings* (July).
- A3 Chen, R., Shalaby, A., and **Da Silva, D.**, (2024). Trends in Toronto's Subway Ridership Recovery: An Exploratory Analysis of Wi-Fi Records. *Transportation Research Record*, 0(0).
- A4 **Da Silva, D.**, Shalaby, A. (2024) Forecasting Short-Term Subway Passenger Flow Using Wi-Fi Data Comparative Analysis of Advanced Time-Series Methods. *Journal of Intelligent Transportation Systems*.
- A5 Othman, K., Ahmed, S., **Da Silva, D.**, Shalaby, A., Abdulhai, B. (2024). Decision Support Tools for Effective Bus Fleet Electrification: Replacement Factors and Fleet Sizing Prediction. *Transportation Research Interdisciplinary Perspectives*.
- A6 Othman, K., **Da Silva, D.**, Shalaby, A., Abdulhai, B. (2024). Interpretable Machine Learning Models for Predicting Ebus Battery Consumption Rates in Cold Climates with and without Auxiliary Heating. *Green Energy and Intelligent Transportation*.

Peer-Reviewed Journal Publications Under Review

- AR1 **Da Silva, D.**, Elsaid, F., Shalaby, A. Constructing Origin-Destination Matrix using Wi-Fi and AFC Data. *Transportation (Under Review)*.

Peer-Reviewed Conference Publications

- B1 Chen, R., Shalaby, A., **Da Silva, D.** (2024). Trends in Toronto's Subway Ridership Recovery: An Exploratory Analysis of Wi-Fi Records. In *Proceedings of the 103rd Transportation Research Board*. Washington, DC. 32 pages.

Peer-Reviewed Conference Presentations

- C1 Othman, K., **Da Silva, D.**, Hamed, S., Shalaby, A., Abdulhai, B. (2024). Decision Support Tools for Effective Bus Fleet Electrification: Replacement Factors and Fleet Sizing Prediction. *104th Annual Meeting of the Transportation Research Board*. Washington, DC.
- C2 **Da Silva, D.**, Shalaby, A. (2024). Forecasting Short-Term Subway Passenger Flow Using Wi-Fi Data Comparative Analysis of Advanced Time-Series Methods. *103rd Annual Meeting of the Transportation Research Board*. Washington, DC.
- C3 Othman, K., **Da Silva, D.**, Shalaby, A., Abdulhai, B. (2024). Data-Driven Prediction of e-Bus Battery Consumption Rates Using Machine Learning Techniques in the Canadian Environment. *103rd Annual Meeting of the Transportation Research Board*. Washington, DC.
- C4 R Chen, A Shalaby, **Da Silva, D.** (2024). Trends in Toronto's Subway Ridership Recovery: An Exploratory Analysis of Wi-Fi Records. *103rd Annual Meeting of the Transportation Research Board*. Washington, DC.

- C5 **Da Silva, D.**, Elsaid, F., Shalaby, A. (2023). Constructing Origin-Destination Demand Matrix Using Wi-Fi and Automated Fare Collection Gate Count Data: A Case Study of Toronto's Subway Network. *102nd Annual Meeting of the Transportation Research Board*. Washington, DC.
- C6 **Da Silva, D.**, Robinson, M. Liu, R., Klumpenhower, W., Shalaby, A., and Karner, A. (2022). A Flexible Itinerary-Based Fare Calculator with Detailed Transfer Modeling. *101st Annual Meeting of the Transportation Research Board*. Washington, DC.

Conference Abstracts

- D1 Klumpenhower, W., Allen, J., Li, L., Liu, R., Robinson, M., **Da Silva, D.**, Farber, S., Karner, A., Rowangould, D., Shalaby, A., Buchanan, M., and Higashide, S. (2021). Dashboarding Transit Accessibility *Canadian Urban Transit Association 2021 Virtual Conference*. Toronto, Canada.
- D2 **Da Silva, D.**, Elsaid, F., Shalaby, A. (2023). Constructing Origin-Destination Demand Matrix Using Wi-Fi and Automated Fare Collection Gate Count Data. *25th Ontario Transportation Expo - Conference and Trade Show*. Toronto, Canada.
- D3 Othman, K., **Da Silva, D.**, Shalaby, A., Abdulhai, B. (2024). Data-Driven Prediction of e-Bus Battery Consumption Rates. *25th Ontario Transportation Expo - Conference and Trade Show*. Toronto, Canada.

Relevant Professional Experience

Manager, Advanced Analytics and Digital Transformation

Deloitte Touche Tohmatsu

Sao Paulo, SP, Brazil

August 2019 - September 2021

- Directed the planning, implementation, and operation of information systems across diverse industries, including Banking, Payments, Communications, Insurance, Logistics, and Software Development. Managed budgets, timelines, and client requirements, while assembling and supervising cross-functional teams. Developed and enforced policies for data processing, system development, and operations. Recruited and mentored personnel, overseeing professional development and training to ensure project success.

Senior Consultant, Advanced Analytics and Digital Transformation

Deloitte Touche Tohmatsu

Sao Paulo, SP, Brazil

April 2017 - August 2019

- Collaborated with clients to identify and document requirements, assess technical and security risks, and deliver tailored information system solutions. Conducted business and technical studies, designed and implemented software systems, and advised on strategy, policy, and service delivery. Developed and enforced policies to optimize the software development life cycle, ensuring high-quality outcomes. Performed independent third-party reviews to evaluate quality assurance practices, software products, and information systems.

Senior Analyst, IT PMO

Nextel Communications

Sao Paulo, SP, Brazil

September 2012 - December 2015

- Led contingency and business continuity planning, ensuring seamless deployment and quality testing of HSPA/HSPA+/LTE networks. Coordinated IT user acceptance testing across development and deployment stages, including unit, automated, and end-to-end testing, to guarantee system reliability and performance.

Product Analyst, Digital Channels

Itau-Unibanco Bank

Sao Paulo, SP, Brazil

November 2010 - September 2012

- Delivered data-driven insights on customer behavior across digital channels (ATM, internet banking, and mobile banking) for a customer base of approximately 16 million. Monitored and reported key performance metrics for critical banking products. Led Business Intelligence and Data Analytics projects utilizing tools such as SAS, SQL, R, and MicroStrategy to support strategic decision-making.

Student Research Mentorship

- **Co-Supervisor:** Guided Rohan Wongkee in testing machine learning methods on Wi-Fi data to predict service disruptions at the Toronto Transit Commission (TTC). University of Toronto. Supported through the Natural Sciences and Engineering Research Council of Canada (NSERC) Undergraduate Student Research Award. (Summer 2023).
- **Co-Supervisor:** Oversaw Roger Chen's MSc dissertation, Investigating Post-Pandemic Recovery Trends in Subway Ridership Using Toronto Wi-Fi Data, successfully defended in September 2024.
- **Co-Supervisor:** Mentored Jack Tattersall on his MSc dissertation, Measuring Intermodal/Interagency Connections at Suburban Rail Stations and Improving Service Integration, successfully defended in September 2024.

Professional Development and Certifications

Deep Learning and Reinforcement Learning Summer School

Canadian Institute for Advanced Research

Toronto, ON, Canada

July, 2024

- The Summer School, co-hosted by CIFAR and the Vector Institute, covered foundational research, new developments, and real-world applications of deep learning and reinforcement learning. Over 10 intensive days, I had the opportunity to learn from Canada CIFAR AI Chairs and other globally renowned experts from industry and academia.

Indigenous Perspectives in AI - Post Graduate

Canadian Institute for Advanced Research

Toronto, ON, Canada

July, 2024

- Self-paced independent learning course that helped me consider how AI projects can benefit from Indigenous knowledge and perspectives, and contribute to efforts towards reconciliation. Certification ID: azsdttdqcyf

Trustworthy and Responsible AI Learning (TRAIL) Certificate

Mila - Quebec Artificial Intelligence Institute

Montreal, QC, Canada

January 19 - February 15, 2024

- The TRAIL program provided the foundational knowledge, skills and tools to responsibly design and conduct AI projects. The program also encompassed how to apply best practices and methodologies throughout the AI life cycle, from identifying ethical concerns to assessing impact and investigating and mitigating unintended consequences. Certification ID: eabdc210-7776-480b-8e61-20139390864b

Deep Learning for Natural Scientists

York University and The Fields Institute for Research in Mathematical Sciences

Toronto, ON, Canada

Fall 2023

- Completed an advanced deep learning course by Fields Institute and the Department of Physics & Astronomy/York University. Topics: ML basics, Deep Feedforward Networks, Regularization, Optimization, Convolutional Networks, Recurrent/Recursive Nets, Attention, Transformers and applications in natural sciences.

Public Transit Planning & ITS, Public Transit Modelling

University of Toronto

Toronto, ON, Canada

August 15 - 17, 2023

- Attended and completed two courses over three days on public transit planning, modelling, and the application of information technology systems in transit.
- Learned from world-renowned transit researchers Drs Nigel Wilson, Eric Miller, Amer Shalaby, and Brendon Hemily.

Conferences, Events and Programs

Toronto, ON, Canada

The Fields Institute for Research in Mathematical Sciences

- Conference on Optimization - November 25 - 27, 2019.
- Conference on Data Science and Optimization - November 18 - 20, 2019.
- Conference on Data Science - November 12 - 15, 2019.
- Winter School on Computational Data Science and Optimization - November 4 - 8, 2019.
- Quantum Futures Hackathon - October 18 - 20, 2019.
- Bootcamp on Machine Learning for Finance - September 26 - 27, 2019.

Professional Certification - Scrum Master I

Sao Paulo, SP, Brazil

Scrum.org

June 4, 2018

- Scrum Master Certification for Agile Project Management.

Summer School on Big Data

Rio de Janeiro, RJ, Brazil

Federal University of Rio de Janeiro

May, 2014

- New developments and real-world applications in Natural Language Processing (NLP).

MOOCs

edX

- Urban Transit for Livable Cities - University of Pennsylvania - Issued August 4, 2023.
- Leveraging Urban Mobility Disruptions to Create Better Cities - MITx - Issued August 4, 2023.
- Big Data and Social Physics - MITx - Issued May 23rd, 2014.

Coursera

- Supervised Machine Learning: Regression and Classification - Stanford University - Issued August 19, 2022.
- Exploratory Data Analysis - Johns Hopkins University - Issued August 5, 2014.
- Getting and Cleaning Data - Johns Hopkins University - Issued June 17, 2014.
- R Programming - Johns Hopkins University - Issued May 8, 2014.

Volunteer and Extracurricular Activities

Climate Resilient Communities (CRC.green)

Toronto, ON, Canada

Volunteer Software Engineer

Spring 2023 - Fall 2024

- Led the development of a user-friendly open-data platform to support low-income communities in Toronto to tackle climate change.
- Volunteered as an instructor for training community leaders in Data Analytics and Civic Innovation.

University of Toronto Grappling Club

Toronto, ON, Canada

Hart House Martial Arts Instructor

2019 - 2024

- Brazilian Jiu Jitsu (BJJ) Black Belt. International Brazilian Jiu Jitsu Federation (IBJJF) ID Number: 407649
- BJJ Referee issued by CBJJE (Brazilian Confederation of Sport Jiu Jitsu).
- BJJ Coach at the Hart House/UofT.
- First Aid & CPR/AED level C (BL) issued by Canadian Red Cross. Certificate number: 105351387. Expiry Date: 2027-09-08

Nextel Institute Tutoring Program

Tutor

Sao Paulo, SP, Brazil

Spring 2014

- Volunteered as a tutor in vocational training for high school students who were in situations of social vulnerability.