Marcos Machado

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Executive Summary

- My primary research interests are in the fields of Business Analytics, Operational Research, and Machine Learning (ML) models and their applications for business problems, especially in the financial industry.

- With 7+ years in the financial industry, I have excelled as a Financial Analyst, Officer, and Research Modeling Analyst across 3 companies. I have also honed my teaching skills, empowering students from diverse backgrounds for 6+ years.

- Actively participating in projects funded (+27 million euros) by the European Union: Digital (Marie Skłodowska-Curie Doctoral Network) and IS2H4C (Horizon Europe), and Dutch Government (Kick Start AI).

- I am a member of the Institute for Operations Research and the Management Sciences (Informs).

Experience

UNIVERSITY OF TWENTE
Enschede, The Netherlands

Assistant Professor of Business Information Systems — *May 2022 - Present*
- Teaching in different courses (graduate and undergraduate levels): Smart Systems Industry, Business Process Management, Enterprise Software for the Integration of Administrative Processes, Applications of IT in Finance, and Applications of AI in Business.
- Supervising bachelor's and master's students in their thesis and internship.
- Involved in ongoing research projects with different faculty members at the University of Twente.
- Currently, Marcos Machado serves as co-PI in multiple research projects (e.g., Kickstart AI, IS2H4C, and MSCA DN).

ONTARIO TECH UNIVERSITY
Oshawa, ON

PH.D. CANDIDATE & TEACHING ASSISTANT — *Sep. 2018 - Apr. 2022*
- Ph.D. thesis: *Applications of hybrid Machine Learning (ML) algorithms to predict Customer Relationship Management (CRM) metrics in the financial industry.*
- Teaching: Preparing and conducting tutorials and grading projects and exams for different undergraduate Business courses: *Introductory Calculus, Discrete Mathematics, Statistics, and Business Computer Applications.*

SCOTIABANK
Toronto, ON

RESEARCH MODELLING ANALYST — *Mar. 2019 - Aug. 2019*
- Unifying and pre-processing datasets from multiple sources.
- Implementing machine learning models to assess customer credit risk.
- Preparing reports describing research outcomes and delivering presentations for the bank managers.
- Project supported by NSERC Engage.

NATIONAL MONEY MART: DOLLAR FINANCIAL GROUP
Vancouver, BC

FINANCE OFFICER ADMINISTRATOR — *May 2017 - Apr. 2018*
- Providing customer counseling, and Selling banking services (cashing cheques, loans, credit cards, etc.).
- Mediating pre, lapsed, and collection calls.

BANCO BRADESCO S/A
Sao Paulo, Brazil

FINANCIAL ANALYST — *Jun. 2010 - Dec. 2016*
- Developing and optimizing pricing credit models.
- Assessing credit risk of new businesses in the real estate industry by analysing financial proposals and customer's historic data.

DR. ANTONIO B. GAMBARINI HIGH SCHOOL
Sao Paulo, Brazil

HIGH SCHOOL TEACHER — *Jun. 2010 - Dec. 2011*
- Preparing and leading Mathematics classes for high school students.

Education

UNIVERSITY OF TWENTE
Enschede, Netherlands

University Teaching Qualification (UTQ) Certificate — *May. 2022 - Feb. 2024*

ONTARIO TECH UNIVERSITY
Oshawa, Canada

Ph.D. in Modelling and Computational Science — *Sep. 2018 - Apr. 2022*

UNIVERSITY OF SAO PAULO (USP)
Sao Paulo, Brazil

Master of Science (Industrial Engineering) — *Feb. 2015 - Dec. 2016*

GETULIO VARGAS FOUNDATION (FGV)
Sao Paulo, Brazil

Post-Graduate Degree in Business (Diploma) — *Feb. 2012 - Nov. 2013*

FEDERAL INSTITUTE OF EDUCATION, SCIENCE AND TECHNOLOGY OF CEARA (IFCE)
Ceara, Brazil

Bachelor in Mathematics — *Feb. 2005 - Sep. 2009*

Publications

PEER-REVIEWED JOURNAL ARTICLES

- **M. R. Machado** and B. vann Braak, How can Consumers with Little or No Credit History Benefit from the Use of AI by Banks and Financial Institutions? Experiments with Class Imbalance and Bias Issues in Credit Risk Assessment. Information Processing & Management [Under review, Sep. 2023].
- A. Amato, J. Osterrieder and **M. R. Machado**, Integration of Early Warning Systems and Customer Segmentation Methods in the Financial Industry - A Systematic Literature Review. International Journal of Info. Management Data Insights [Under Review, Oct. 2023].
- A. Asadi and **M. R. Machado**, Optimal Operations of Drones for Humanitarian Activities Using Reinforcement Learning [Working Paper].
- **M. R. Machado**, A. Asadi, Renato W. de Souza, and W. Ugulino, Green AI in the Finance Industry: Experiments with Feature Engineering in Hybrid Machine Learning Models. Applied Soft Computing. [Under Review, Jan. 2024].
- E. P. Medeiros, E. D. G. de Freitas, D. S. da Silva, **M. R. Machado**, and R. W. de Souza. Applications of machine learning algorithms to support COVID-19 diagnosis using X-rays data information. Expert Systems with Applications, 238, 122029.
- **M. R. Machado** and S. Karray, The Value of Text Data in Predicting and Explaining Customer Risk-Adjusted Revenue Using Individual and Hybrid ML Approaches: An Application To The Loan Industry. Information Systems Frontiers. [Under Review, Dec. 2023].
- J. Osterrieder, B. Hadji-Misheva, and **M.R. Machado**, Digital Finance - Reaching New Frontiers (December 3, 2022). Available at SSRN: http://dx.doi.org/10.2139/ssrn.4292504
- **M. R. Machado** and S. Karray, Applying hybrid machine learning algorithms to assess customer risk-adjusted revenue in the financial industry. Electronic Commerce Research and Applications, 101202, 2022. DOI: https://doi.org/10.1016/j.elerap.2022.101202.
- **M. R. Machado** and S. Karray, Assessing Credit Risk of Commercial Customers Using Hybrid Machine Learning Algorithms, 2022. Expert Systems with Applications, 200, 116889. DOI: https://doi.org/10.1016/j.eswa.2022.116889.
- **M. R. Machado**, M. Fujii, C. O. Ribeiro, and, E.E. Rego. An Agent-based Model Applied to Brazilian Wind Energy Auctions. 2019, IEEE Latin America Transactions. DOI: 10.1109/TLA.2019.8891956.

PEER-REVIEWED ARTICLES IN CONFERENCE PROCEEDINGS

- J. Moreira, W. Ugulino, **M. R. Machado**, and L. F. Pires, Challenge-Based Learning and Constructive Alignment: A Challenge for Information Systems' Educators. European Society for Engineering Education (SEFI). DOI: 10.21427/V8GC-C794.
- **M. R. Machado** and S. Karray, (2022). Machado, M. R., & Karray, S. (2022). Integrating Customer Portfolio Theory and the Multiple Sources of Risk Approaches to Model Risk-Adjusted Revenue. IFAC-PapersOnLine, 55(16), 356-363. DOI: https://doi.org/10.1016/j.elerap.2022.101202.
- **M. R. Machado**, S. Karray and I. T. de Sousa, (2019). LightGBM: an Effective Decision Tree Gradient Boosting Method to Predict Customer Loyalty in the Finance Industry. 14th International Conference on Computer Science & Education (ICCSE), Toronto, ON, Canada, 2019, pp. 1111-1116. DOI: 10.1109/ICCSE.2019.8845529.
- J. C. Olimpio and **M. R. Machado**, (2018). Process Optimization During Contracting in Real Estate - A Case Study. In: 18ª LARES – Latin American Real Estate, Sao Paulo. Conference proceeding. ISBN: 978-85-66934-09-0.
- **M. R. Machado** and C.O. Ribeiro, (2015). Logistic Regression Applied to Real Estate Business. In: XXXV Production Eng. National Conference, Fortaleza. Conference Annais. ISSN ENEGEP: 2594-9713 / ISSN ICIEOM: 23178000.
- **M. R. Machado**, M. R. Crespo, A. C. Rocha, and C.O. Ribeiro, (2015). Analysis of Investment Quality in a Real Estate Fund: A Case Study. In: 15ª LARES – Latin American Real Estate, Sao Paulo. Conference proceeding. ISBN: 978-85-66934-06-9.

BOOK CHAPTER

- **M. R. Machado**, M. R. Crespo, A. C. Rocha, and C.O. Ribeiro. Analysis of Investment Quality in a Real Estate Fund: a Case Study. In: I Premio Lares Abecip Secovi-SP: Solucoes para o Mercado e Credito Imobiliario. Etcetera Press, 2016, pp. 75-98.

Conferences

PRESENTATIONS & TALKS

- 2023 17th International Conference on Computational and Financial Econometrics (CFE 2023), Berlin - Germany (December, 2023). [Invited]
- 2023 51st Annual Conference of the European Society for Engineering Education (SEFI), Dublin - Ireland (September, 2023).
- 2023 INFORMS Annual Meeting, Phoenix, Arizona - USA (October, 2023). [Invited]
- FinanceCom 2022 - 11th International Workshop. Enschede, Netherlands (August, 2022). [Invited]
- 18th IFAC Workshop on Control Applications of Optimization, Gif-sur-Yvette, France (July, 2022).
- 32nd EURO (The Association of European Operational Research Societies), Espoo, Finland (July, 2022).
- Industrial Eng. and Business Inf. Systems Seminar. University of Twente, Enschede, Netherlands (June, 2022). [Invited]
- 8th IEEE International Conference on Data Science and Advanced Analytics (DSAA), Porto - Portugal (October, 2021).
- 2021 INFORMS Annual Meeting, Anaheim, California - USA (October, 2021). [Invited]
- Canadian Operational Research Society (CORS) Conference, Toronto, Ontario - Canada (June, 2021).
- 14th International Conference on Computer Science & Education (ICCSE), Oshawa, Ontario - Canada (August, 2019).
- 18th Latin American Real Estate Society (LARES) International Conference, Sao Paulo - Brazil (September, 2018).
- 15th Latin American Real Estate Society (LARES) International Conference, Sao Paulo - Brazil (October, 2015)
- XXXV Production Engineering National Conference (ENEGEP), Fortaleza - Brazil (October, 2015).

PARTICIPATION

- 2021-2023 Industrial Eng. and Business Information Systems Seminar Series (University of Twente).
- 2020-2021 Machine Learning Advances and Applications Seminar (FIELDS Institute).
- 2020 INFORMS Annual Meeting.
- 2020 EURO Working Group on the Practice of Operations Research Conference.

ORGANIZATION

- 2023 - Spring School (For student from IIT Delhi attending at University of Twente: Member of the Organizing Committee & Speaker.
- 2022 - FinanceCom (11th International Workshop): Member of the Organizing Committee.
- 2021-2023 - INFORMS Annual Meeting: Session Organizing.

Grants & Funded Projects

2023	**Co-PI, Horizon Europe (IS2H4C) - 23 million euros**, University of Twente	*Enschede, NL*
2023	**Co-PI, Marie Skłodowska-Curie Doctoral Network - 4.5 million euros**, University of Twente	*Enschede, NL*
2023	**PI, OCW - Dutch Minister of Education, Culture, and Science - 300k euros**, University of Twente	*Enschede, NL*
2023	**Co-PI, Circular Economy Platform (UT Climate Centre Call) - 20k euros**, University of Twente	*Enschede, NL*
2023	**Co-PI, BMS Strategic Research Fund (COST and MSCADN Calls) - 35k euros**, BMS Faculty	*Enschede, NL*
2022	**Co-PI, BMS Strategic Research Fund - (European Horizon Call) - 20k euros**, BMS Faculty	*Enschede, NL*

Scholarships and Awards

2022	**Best Thesis Award**, Faculty of Business and Information Technology	*Oshawa, Canada*
2022	**Conference Travel Award**, Faculty of Business and Information Technology	*Oshawa, Canada*
2021	**Student Conference Travel Award**, School of Graduate and Postdoctoral Studies	*Oshawa, Canada*
2021	**Doctoral Excellence in Research Award**, Faculty of Business and Information Technology	*Oshawa, Canada*
2021	**2nd Place - Data Analytics Competition**, University of New Brunswick (UNB)	*NB, Canada*
2018–2022	**Graduate International Tuition Scholarship**, School of Graduate and Postdoctoral Studies	*Oshawa, Canada*
2016	**Conference Travel Award**, Polytechnic School of the University of Sao Paulo	*Sao Paulo, Brazil*
2015	**Best Paper Award**, Latin American Real Estate Society (LARES) Conference.	*Sao Paulo, Brazil*

Service

ASSOCIATE EDITOR & MEMBER OF PROGRAM COMMITTEE

- 2023: Member of the BIToC (Business Information Technology (BIT) program committee), University of Twente.
- 2023: Digital Finance, Springer (Associate Editor).
- 2023: 22nd EPIA Conference on Artificial Intelligence (Member of Program Committee).

JOURNAL REVIEWER

- 2023: Open Research Europe.
- 2023: SN Computer Science.
- 2023: Digitial Finance.
- 2023: Information Processing & Management.
- 2023: Cogent Economics and Finance.
- 2021 - 2023: Expert Systems with Applications.
- 2021 - 2023: Information Technology & People.
- 2021 - 2023: International Journal of Information Technology & Decision Making.

CONFERENCE REVIEWER

- 2022 Southeastern Decision Science Inst. (SEDSI, 2022).
- 2022 Workshop on Control and Optimization (CAO, 2022).
- 2022 Pacific Asia Conference on Information Systems (PACIS, 2022).

STUDENTS SUPERVISION (Most recent students' supervision)

- **(BSc Ongoing - 2023) Anton Tsankov**: Optimizing hospital contract decision-making: Using information visualization pattern identification and anomaly detection in support of tactical analysis. Business Information Technology, University of Twente.
- **(BSc Ongoing - 2023) Alexandru Matcov**: Explainable AI in credit risk Assessment for Non-Expert Customers. Business Information Technology, University of Twente.
- **(MSc Ongoing - 2023) Sebastian Goldmann**: Optimizing Credit Risk Prediction: Incorporating time series classification algorithms, University of Twente.
- **(BSc Finished - 2023) Bjorn van Braak**: Experiments for class imbalance and bias in customers' credit risk assessment with little or no credit history. Business Information Technology, University of Twente, **Resulting paper is currently under review.**
- **(MSc Finished - 2023) Alessandra Amato**. Applications of early warning systems in customer segmentation methods throughout use of ML algortithms. Business Information Technology, University of Twente. **Resulting paper is currently under review.**
- **(MSc Finished - 2023) Edo Belva Firmansyah**. Applications of Hybrid (and eXaplainable) ML algorithms to assess RAR in the Telecommunication industry. Business Information Technology, University of Twente.
- **(MSc Finished - 2023) Luca Kozian**. Observable determinants of time-varying commodity price co-movement. Business Administration, University of Twente.
- **(MSc Finished - 2023) Jaap Beltman**. Early warning systems for retail customers in the banking industry: an ML-driven approach. Industrial Engineering and Management, University of Twente. **3rd place in the best thesis award of 2022-2023 academic year.**
- **(BSc Finished - 2023) Tijmen Prins**: Ordering process optimization of paint at Uw Onderhoudspartner Lenferink. Industrial Engineering and Management, University of Twente.
- **(BSc Finished - 2023) Augustin I. Catalab** : The impact of public sentiment on Crypto resilience during Covid-19 pandemic. International Business Administration, University of Twente.
- **(BSc Finished - 2023) Giovanni Herbert**: Applications of ML algorithms to assess credit risk – experiments with missing data. International Business Administration, University of Twente.
- **(BSc Finished - 2023) Marcus Müller**: Exploring the evolution and impact of credit scoring in the European Union: An analysis of alternative data, individual consumer data, and regulatory frameworks. International Business Administration, University of Twente.
- **(BSc Finished - 2022) Juliane Bezerra**. Use of text-based features to assess CRM metrics. Information Systems, Federal Institute of Education, Science and Technology. **Second supervision done in collaboration with Dr. Renato William (IFCE, Brazil).**
- **(BSc Finished - 2022) Kaio Anderson**. Applications of hybrid ML models to assess customer loyalty. Information Systems, Federal Institute of Education, Science and Technology. **Second supervision done in collaboration with Dr. Renato William (IFCE, Brazil).**

Academic Training

2023	Mendix Rapid Developper & Workflows (Mendix Academy).
2020	Applied Text Mining in Python, University of Michigan (Coursera).
2020	Applied Plotting, Charting & Data Representation in Python, University of Michigan (Coursera).
2019	Natural Language Processing in TensorFlow, DeepLearning.AI (Coursera).
2019	Sequences, Time Series and Prediction, DeepLearning.AI (Coursera).
2019	Introduction to Deep Learning, HSE University (Coursera).
2019	Neural Networks and Deep Learning, DeepLearning.AI (Coursera).
2019	Structuring Machine Learning Projects, DeepLearning.AI (Coursera).
2019	Machine Learning Foundations: A Case Study Approach, University of Washington (Coursera).
2019	Machine Learning, Stanford University (Coursera).
2018 - 2019	High Performance Computing, Numerical Analysis, and Modelling and Simulating Systems Using Discrete Units, Ontario Tech University (Ph.D. courses).

Outreach

OTHER CERTIFICATES AND DIPLOMAS

- 2023 - Mendix (MX): Rapid Developer, Mendix Academy, Netherlands.
- 2022 - Designing a Lesson and a Course. University of Twente, Enschede, NL.
- 2022 - Supervising Students. University of Twente, Enschede, NL.
- 2019 - Machine Learning Graduate Course (Certificate). The FIELDS Institute, Toronto, ON.
- 2018 - Diploma in Business Communications (Co-op). Greystone College, Vancouver - BC.
- 2015 - Certificate in Economy, Markets and Financial Analysis. Institute Foundation of Economics Research (FIPE), SP - Brazil.
- 2015 - Certificate in Mathematics and Applied Statistics. Vanzolini Foundation (FCAV), SP - Brazil.
- 2008 - Technical Certificate in Industrial Mechanics. Federal Institute of Education, Science and Technology (IFCE), CE - Brazil.

SKILLS

- Programming languages/ Software: Minitab, E-views, SPSS, MySQL, SAS, Stata, Excel – VBA, Python, Matlab, C, Linux/Ubuntu, repository management, OMP/MPI, and visualization.
- Analysis techniques: asymptotic analysis, Markov chains, and factor analysis.
- Languages: English (Fluent), Spanish (Advanced), Dutch (Beginner) and Portuguese (Native).

VOLUNTEER

- Tutoring Math and programming at Paulo VI High School (2005-2007).
- Technical support in the computer lab at Filgueiras Lima High School (2003-2005).