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CURRENT POSITION

Constructor University – Bremen, Germany 02/2026-Present
Assistant Professor of Computer Science and Engineering
Network Science Representative, Women in Network Science
Board Member, Network Science Society & Complex System Society
Associate Editor of Applied Network Science

Supervisions

- 01 (01 completed) PhD Student at the University of Pernambuco (Co-Supervisor)
- 31 (31 completed) MSc Students in courses related to Data Science and Artificial Intelligence at Northeastern University London (Supervisor)
- 05 (03 completed) BSc Students in research projects at the University of Pernambuco and Florida Institute of Technology (Mentorship)

ONGOING PROJECTS

Human Behaviour, Network Science & Complex Systems

- Studying the Gender, Parenthood and Socioeconomic Patterns of Human Mobility (Mobility)
- Investigating how women and men develop and apply strategies for research success (Science of Science)
- Studying gendered dynamics of engagement, visibility, and interaction on social media (Online communication)
- Evaluating cohort homophily and heterogeneity as drivers of student persistence in STEM (Education)

Explained AI, Responsible AI & The Impact of AI

- Modelling social interaction networks to uncover mechanisms of Swarm Intelligence (Explained AI)
- Deploying digital platforms in different countries to collect data of individual preferences in policy proposals (Digital Democracy)
- Deploying experiments in different countries to collect data of individual perception, memory, and behaviour (Human Behaviour)
- Studying human perceptions and perspectives on the use of AI tools (Impact of AI)
- Applying reinforcement learning to optimize hyperparameterisation in machine learning (Machine Learning)

ACADEMIC PROJECTS

- Implemented Particle Swarm Optimization (PSO), Genetic Algorithms (GA) and Fish School Search (FSS) using Java to optimize and compare complex functions.
- Improved a PSO code using State Machine and Fuzzy Logic concepts to control the Energy Consumption of a Swarm of Unmanned Aerial Vehicles (Java)
- Implemented Ant Colony Optimization (ACO) and GA using Java to create a personalized playlist of songs
- Implemented FSS and Multilayer Perceptron (MLP) using Java to determine the major resources that could improve Pernambuco's (a state in Brazil) public safety
- Implemented Genetic Programming (GP) to forecast Time Series
- Executed Knowledge Discovery in Databases (KDD) to identify major problems of Pernambuco such as traffic accidents
- Implemented clustering algorithms to identify students' profile from a Brazilian educational platform
- Created, developed and applied a multi-objective algorithm inspired on FSS family algorithms to solve binary problems
- Improved breast cancer diagnosis using a Brazilian dataset of thermography images

EDUCATION

University of Exeter – Exeter, Devon, UK. 09/2018 – 12/2021
PhD Student in Computer Science – *University of Exeter's Scholarship*
Florida Institute of Technology – Melbourne, Florida, USA. 01/2018 – 07/2018
PhD Student in Computer Science – *Graduate Student Assistant Scholarship*
Universidade de Pernambuco – Recife, Pernambuco, Brazil 08/2016 – 11/2017

MSc in Computer Engineering – *UPE-PFA and CNPq Scholarship*
Pace University – New York, NY, USA 06/2014 – 08/2015
Visiting International Student – *Brazil Scientific Mobility Program Fully-Funded Scholarship Recipient*
Universidade de Pernambuco – Recife, Pernambuco, Brazil 08/2010 – 07/2016
BSc Computer Engineering– *Scientific Scholarship (2012-13) from CNPq*

WORK EXPERIENCE

Northeastern University London

Assistant Professor (11/2023 – 02/2026)

- Taught Programming for Data Science, Applied Machine Intelligence and Bootcamps
- Moderator of the courses of Object-Oriented Programming, Data Synthesis and Programming for Data Science
- Associate Director of Belonging for the Computing, Mathematics, Engineering, and Natural Sciences (CoMENS) Faculties
- Online teaching of contents related to Information Theory, Matrix Decomposition, Neural Network, Deep Learning and Current Applications of Artificial Intelligence
- In person teaching of courses related to Database and Statistics using Python
- In person teaching of courses related to Introduction to Artificial Intelligence and Data visualization

University of Toulouse

Postdoctoral researcher (01/2022 – 11/2023)

- Develop digital platforms for improving political awareness in France
- Analyse individual preferences of political proposals in multiple countries for understanding the extent in which candidates cover what the population stands
- Study human behaviour while interacting with different games and experiments in online platforms for understanding sociodemographic differences on collective memory
- Teach Advanced Topics in Artificial Intelligence and Data Analysis for master's students

University of Exeter

Postgraduate Teaching Assistant (01/2021 – 05/2021)

- Assisted on the module Object-oriented Programming explaining the material and exercises and running tutorials
- Wrote, Helped and Graded Projects

Nokia Bell Labs

Machine Learning Intern (05/2019 – 07/2020)

- Develop research/framework using Natural Language Processing to improve the human knowledge consumption

Florida Institute of Technology

Graduate Mentor (05/2018 – 07/2018)

- Develop research with two undergraduate students to create and analyse interaction networks from the social interactions of swarm-based algorithms to understand why Swarm Intelligence works. Funded by the National Science Foundation
- Manage the research by organizing and dividing tasks through the group considering the undergraduate limitations and desires. Funded by the National Science Foundation

Graduate Student Assistant (01/2018 – 05/2018)

- Taught material of Programming Language C/C++ and Data Structures helping students solving challenging problems
- Graded Quizzes and Assignments

Artics Mobile

Intern (05/2015 – 08/2016)

- Developed Web and mobile applications including front-end, back-end, tests and functionalities using Appcelerator, Calabash, JavaScript, HTML, PHP and Node.js

University of Pernambuco

Postgraduate Teaching Assistant (08/2016 – 12/2016)

- Taught material of Swarm Intelligence helping students programming algorithms

Technical Masters Lab Assistant (08/2013 – 06/2014)

- Managed hardware and software computer problems to ensure all the computers in the lab persisted working
- Catalogued and organized academic documents
- Responsible for collecting financial documents signatures to ensure department investments

JOURNALS & CONFERENCES

- Associate Editor of Applied Network Science
- Guest Editor of the special issue "Network Approaches to Urban Inequality: Spatial, Social, and Systemic Perspectives" in Applied Network Science (2025)
- Guest Editor of the special issue "Networked Inequality: Studies on Diversity and Marginalization" in Applied Network Science (2022)
- Attended and/or presented in Swarm Intelligence, Artificial Intelligence, Machine Learning and Complex Networks' conferences (LACCI, CBIC, BRICS, GECCO, COMPLENET, NETSCI, IC2S2, CCS)

BRICS-CCI\CBIC

Organizer (2013)

- Use Portuguese and English language skills to assist international conference attendees with translating the agenda and helping in their needs
- Helped in the registration of participants to ensure all attendees could access permitted areas
- Responsible for the organization of lectures' room to aiding speakers

COMPLENET

Organizer (2020,2021,2024,2025)

- Helped on the organization of the program and virtual platform
- Assisted attendees and speakers
- Program Chair in 2024 and 2025

Conference on Complex Systems (CCS)

- Organised a satellite about Equality and Fairness – CCS23
- Satellite Chair in CCS24

EXTERNAL MASTER'S DEFENSE COMMITEE

- "Modelling urban environments using mobile phone and online data" defended by Thomas Ryan Collins in September 2025 at the University of Exeter
- "Using imitation learning and population-based learning to optimize: performance and transferability" defended by Gabriel Anunciação Kopte in October 2023 at the University of Pernambuco, Pernambuco, Recife, Brazil
- "Artificial Neural Networks to estimate thermomechanical paste consistency" defended by Rodrigo Cesar Matheus in March 2023 and August 2024 at the Federal University of Technology, Paraná, Ponta Grossa, Brazil

OUTREACH ACTIVITIES

- Participated and helped on women and young events to encourage high school or undergraduate students to Computer Science field (academic and course, 2018-2020)
- Active participant in the book club and postgraduate activities on Women in Network Science to encourage and help women to feel included in academia (2020-Present)
- Part of the Executive Committee of Women in Network Science (2025-Present)
- Board Member of Complex System Society and Network Science Society (2025-Present)

AWARDS

- Best project at the XV University Week at the University of Pernambuco in 2016
- Undergraduate scientific scholarship from National Council for Scientific and Technological Development in Brazil (2012-2013)
- Visiting International Student for one year at Pace University (NY-USA) fully funded by Brazil Scientific Mobility Program
- Master's degree scholarship from University of Pernambuco and National Council for Scientific and Technological Development in Brazil (2016-2017)
- PhD fully funded for 3 years and 9 months by University of Exeter (Devon-UK)
- Outstanding Intern 2019 at Nokia Bell Labs
- Best presentation at EMPS Conference 2020 in the Computer Science department at the University of Exeter
- Second best presentation at CompleNet 2021

LANGUAGES

Portuguese (native)
English (fluent)
Spanish (beginner)
French (studying, beginner, 2.5 years)
German (studying, beginner, 8 months)

TECHNICAL SKILLS

Courses Taught: **Swarm Intelligence*, Programming*, Data Analysis*, Machine Learning***
Computer Languages: **Java*, C, C++, PHP, Python*, Assembly, Haskell, XML**
Databases: **MySQL, Elasticsearch (NoSQL)**
Web & Mobile Knowledge: **CSS, HTML, JavaScript, jQuery Framework, Node.js, Ionic, Appcelerator**
Operating Systems: **Windows, Linux*, OS X***
Methodologies: **SCRUM, RUP, XP**
Tools: **R**, **MATLAB, Apache, SVN, Eclipse*, PyCharm, GitHub*, Bitbucket*, Kibana, Jupyter Notebook*, QGIS**
***Mostly developed**

RESEARCH INTERESTS

Artificial Intelligence	Swarm Intelligence, Evolutionary Computation, Neural Networks, Data Analysis
Human Behaviour	Human Mobility, Gender Inequality, Social Mobility, Academic Mobility, Science of Science, Social Network Analysis, Communication Patterns, Mental Health
Urban Systems	Geospatial Analysis, Economic Development, Cities, Urban Modelling

PUBLICATIONS

UNDER REVIEW

[48] **Macedo, M.**, Oyarzun, M., Candia, C. & Hidalgo, C.A. (2025). *Cultural Proximity Reveals a Local Premium in Collective Memory*. (Submitted, PNAS)

[47] **Macedo M**, Menezes R, Cardillo A. *The parenthood effect in urban mobility*. arXiv preprint arXiv:2501.02299. 2025 Jan 4. (Major Review, Nature Human Behaviour)

[46] **Macedo M**, Saxena A. *Gender differences in online communication: A case study of Soccer*. arXiv preprint arXiv:2403.11051. 2024 Mar 17. (Minor Review, Applied Intelligence (APIN))

[45] Jaramillo AM*, **Macedo M***, Oliveira M, Karimi F, Menezes R. *Systematic comparison of gender inequality in scientific rankings across disciplines*. arXiv preprint arXiv:2501.13061. 2025 Jan 22. *Shared first author (Major Review, Nature Human Behaviour)

[44] Farokhnejad, S., da Mata, A. S., **Macedo, M.**, & Menezes, R. (2025). *Vector fields as a framework for modelling the mobility of commodities*. arXiv preprint arXiv:2506.02047. (Major Review in PLOS ONE)

[43] Navarrete, C., **Macedo, M**., Stojkoski, V., Parada-Contzen, M. and Martínez, C.A., 2023. *Mapping Election Polarization and Competitiveness using Election Results*. arXiv preprint arXiv:2308.10862.

[42] Lira, R. C., **Macedo, M.**, Siqueira, H. V. & Bastos-Filho, C. *Reinforcement Learning Applied to Swarm Intelligence in Continuous Optimisation: A Systematic Review.* (Under Review in IEEE Access)

PUBLISHED PUBLICATIONS

[41] Figueiredo, E., Santana, C., Siqueira, H. V., **Macedo, M.**, Converti, A., Gokhale, A., & Bastos-Filho, C. (2025). *A Simplified Fish School Search Algorithm for Continuous Single-Objective Optimization*. Computation, 13(5), 102.

[40] Lira, R. C., **Macedo, M.**, Siqueira, H.V. & Bastos-Filho, C. (2024, April). *Exploring Social Dynamics in a Reinforcement Learning-based Metaheuristic: A study using Improvement Frequency and Population Turnover.* In 2024 IEEE Latin American Conference on Computational Intelligence (LA-CCI) (pp. 1-6). IEEE.

[39] Lira, R. C., **Macedo, M.**, Siqueira, H. V., Menezes, R., & Bastos-Filho, C. (2024, April). *Social Interactions Matter*: *Is Grey Wolf Optimizer a Particle Swarm Optimization Variation?*. In International Conference on Complex Networks (pp. 101-114). Cham: Springer Nature Switzerland.

[38] da Silva, J.P.F, Lira, R.C., **Macedo, M.**, Siqueira, H.V. & Bastos-Filho, C.. *Volitive Grey Wolf Optimizer*, CBIC2023, Salvador, Brazil.

[37] Navarrete, C., **Macedo, M.**, Colley, R., Zhang, J., Ferrada, N., Mello, M. E., ... & Hidalgo, C. A. (2023). *Understanding political divisiveness using online participation data from the 2022 French and Brazilian presidential elections*. Nature Human Behaviour, 1-12.

[36] Santana, C., **Macedo, M.**, Alves, E., Guerreiro, M. T., Siqueira, H. V., Gokhale, A., & Bastos-Filho, C. (2023). *Bio-Inspired Multi-Objective Algorithms Applied on the Optimisation of the AODV's Routing Recovery Mechanism*. IEEE Access.

[35] Ribeiro, A. A. E., Lira, R. C., **Macedo, M.**, Siqueira, H. V., & Bastos-Filho, C. (2023, September). *Applying Reinforcement Learning for Multiple Functions in Swarm Intelligence*. In Brazilian Conference on Intelligent Systems (pp. 197-212). Cham: Springer Nature Switzerland.

[34] Colley, R., Grandi, U., Hidalgo, C., **Macedo, M.**, & Navarrete, C. (2023). *Measuring and Controlling Divisiveness in Rank Aggregation*. In International Joint Conferences on Artificial Intelligence Organization (IJCAI).

[33] Lira, R. C., **Macedo, M.**, Siqueira, H. V., & Bastos-Filho, C. (2023). *Integrating Reinforcement Learning and Optimization Task: Evaluating an Agent to Dynamically Select PSO Communication Topology*. In *International Conference on Swarm Intelligence* (pp. 38-48). Cham: Springer Nature Switzerland.

[32] Misevic, D., Atal, I., ... **Macedo M.**, ... & Van Der Leeuw, S. (2023). *Harnessing collective intelligence for the future of learning–a co-constructed research and development agenda*. Human Computation, 10(1), 1-30.

[31] **Macedo, M.,** Jaramillo, A. M., & Menezes, R. (2023). *Academic Mobility as a Driver of Productivity: A Gender-centric Approach*. In International Workshop on Complex Networks (pp. 120-131). Springer, Cham.

[30] Lira, R. C., **Macedo, M.**, Siqueira, H. V., & Bastos-Filho, C. (2022, November). *Boolean Binary Grey Wolf Optimizer*. In 2022 IEEE Latin American Conference on Computational Intelligence (LA-CCI) (pp. 1-6). IEEE.

[29] **Macedo, M.,** Lotero, L., Cardillo, A., Menezes, R., & Barbosa, H. (2022). *Differences in the spatial landscape of urban mobility: gender and socioeconomic perspectives*. PloS one, 17(3).

[28] Lira, R. C., **Macedo, M.**, Siqueira, H. V., Menezes, R., & Bastos-Filho, C. (2021, November). *Modelling the Social Interactions in Grey Wolf Optimizer*. In 2021 IEEE Latin American Conference on Computational Intelligence (LA-CCI) (pp. 1-6). IEEE.

[27] Jaramillo, A. M., **Macedo, M.,** & Menezes, R. (2021). *Reaching to the Top: The Gender Effect in Highly-Ranked Academics in Computer Science*. Advances in Complex Systems.

[26] **Macedo, M.,** Santana, M., dos Santos, W. P., Menezes, R., & Bastos-Filho, C. (2021). *Breast cancer diagnosis using thermal image analysis: A data-driven approach based on swarm intelligence and supervised learning for optimized feature selection.* Applied Soft Computing, 109, 107533.

[25] **Macedo, M.,** Taw, L., Gurrapadi, N., Lira, R. C., Pinheiro, D., Oliveira, M., Bastos-Filho, C. & Menezes, R. (2021, June). *Fishing for interactions: a network science approach to modeling fish school search*. In Proceedings of the Genetic and Evolutionary Computation Conference (pp. 40-48).

[24] **Macedo, M.,** Siqueira, H., Figueiredo, E., Santana, C., Lira, R. C., Gokhale, A., & Bastos-Filho, C. (2021). *Overview on Binary Optimization Using Swarm-Inspired Algorithms.* IEEE Access, 9, 149814-149858.

[23] Bastos-Filho, C. J. A., de Lima-Neto, F. B., Lins, A. J. D. C. C., de Lacerda, M. G. P., **Macedo, M.** , de Santana Junior, C. J., ... & Dias, J. L. V. (2021). *Fish School Search: Account for the First Decade. In Handbook of AI-based Metaheuristics* (pp. 21-42). CRC Press.
[22] Siqueira, H., **Macedo, M.,** Tadano, Y. D. S., Alves, T. A., Stevan, S. L., Oliveira, D. S., ... & Converti, A. (2020). *Selection of temporal lags for predicting riverflow series from hydroelectric plants using variable selection methods*. Energies, 13(16), 4236.
[21] Oliveira, M., Pinheiro, D., **Macedo, M**., Bastos-Filho, C., & Menezes, R. (2020). *Uncovering the social interaction network in swarm intelligence algorithms*. Applied Network Science, 5, 1-20.
[20] Siqueira, H., Santana, C., **Macedo, M.,** Figueiredo, E., Gokhale, A., & Bastos-Filho, C. (2020). *Simplified binary cat swarm optimization*. Integrated Computer-Aided Engineering, 1-15.
[19] **Macedo, M**., Lotero, L., Cardillo, A., Barbosa, H., & Menezes, R. (2020). *Gender Patterns of Human Mobility in Colombia: Reexamining Ravenstein's Laws of Migration*. In Complex Networks XI (pp. 269-281). Springer, Cham.
[18] Gurrapadi, N., Taw, L., **Macedo, M.**, Oliveira, M., Pinheiro, D., Bastos-Filho, C., & Menezes, R. (2019, November). *Modelling the Social Interactions in Ant Colony Optimization*. In International Conference on Intelligent Data Engineering and Automated Learning (pp. 216-224). Springer, Cham.
[17] **Macedo, M.**, Santana, C., Siqueira, H., Rodrigues, R. L., Ramos, J. L. C., Silva, J. C. S., ... & Bastos-Filho, C. J. (2019, July). *Investigation of College Dropout with the Fuzzy C-Means Algorithm*. In 2019 IEEE 19th International Conference on Advanced Learning Technologies (ICALT) (Vol. 2161, pp. 187-189). IEEE.
[16] Santana, C. J., Bastos-Filho, C. J., **Macedo, M.**, & Siqueira, H. (2019, June). *SBFSS: Simplified Binary Fish School Search*. In 2019 IEEE Congress on Evolutionary Computation (CEC) (pp. 2595-2602). IEEE.
[15] Figueiredo, E., **Macedo, M.,** Siqueira, H. V., Santana Jr, C. J., Gokhale, A., & Bastos-Filho, C. J. (2019). *Swarm intelligence for clustering—A systematic review with new perspectives on data mining*. Engineering Applications of Artificial Intelligence, 82, 313-329.
[14] Taw, L., Gurrapadi, N., **Macedo, M.**, Oliveira, M., Pinheiro, D., Bastos-Filho, C., & Menezes, R. (2019). *Characterizing the Social Interactions in the Artificial Bee Colony Algorithm*. In 2019 IEEE Congress on Evolutionary Computation (CEC), pp. 1243-1250. IEEE, 2019.
[13] Santana Jr, C. J., **Macedo, M.**, Siqueira, H., Gokhale, A., & Bastos-Filho, C. J. (2019). *A novel binary artificial bee colony algorithm*. Future Generation Computer Systems, 98, 180-196.
[12] Siqueira, H., Figueiredo, E., **Macedo, M.**, Santana, C. J., Bastos-Filho, C. J., & Gokhale, A. A. *Boolean Binary Cat Swarm Optimization Algorithm* in 2018 IEEE Latin American Conference on Computational Intelligence (LA-CCI), pp. 1–6, 2018, IEEE.
[11] **Macedo, M.**, Figueiredo, E., Soares, F. M. B., Siqueira, H., Maciel-Filho, A. M., Gokhale, A. A. & Bastos-Filho, C. J. *Clustering Students Based on Grammatical Errors for Education On-line* in Learning and Nonlinear Models - Journal of the Brazilian Society on Computational Intelligence (SBIC), pp. 26–40, 2018.
[10] Siqueira, H., Figueiredo, E., **Macedo, M.**, Santana, C. J., Santos, P., Bastos-Filho, C. J., & Gokhale, A. A. *Double-Swarm Binary Particle Swarm Optimization* in 2018 IEEE Congress on Evolutionary Computation (CEC), pp. 1–8, Jul. 2018, IEEE.
[9] **Macedo, M.,** dos Santos, C. H. M., Van Leijden, E. M. L., de Oliveira, J. F. L., de Lima Neto, F. B., & Siqueira, H. *Hyper-Heuristics Using Genetic Programming to Time Series Forecasting* in 2018 IEEE Latin American Conference on Computational Intelligence (LA-CCI), pp. 1–6, Nov. 2018.
[8] **Macedo, M.**, Bastos-filho, C., & Menezes, R. (2018). *Improved Multi-Objective Binary Fish School for Feature Selection* in FLAIRS-2018, pp.189–192, AAAI, 2018.
[7] **Macedo, M.**, Bastos-Filho, C. J., Vieira, S. M., & Sousa, J. M. *Multi-Objective Binary Fish School Search*. in Critical Developments and Applications of Swarm Intelligence, pp. 53–72, 2018, IGI Global.
[6] Santana-Junior, C. J., Alves, E. P., Figueiredo, E., **Macedo, M.,** Santos, P., Hugo Siqueira, Gokhale, A. A., & Bastos-Filho, C. J. *Improving AODV Routing Protocol for Mobile Ad-Hoc Networks Using Swarm-Based Algorithms* in Brazilian Conference in Computational Intelligence (CBIC 2017), 2017.
[5] Santos, P., **Macedo, M.**, Figueiredo, E., Santana, C. J., Soares, F., Siqueira, H., ... & Bastos-Filho, C. J. (2017, November). *Application of PSO-based clustering algorithms on educational databases* in IEEE Latin American Conference on Computational Intelligence (LA-CCI), pp. 1–6, 2017, IEEE.
[4] Oliveira, M., Pinheiro, D., **Macedo, M**., Bastos-Filho, C., & Menezes, R. *Better exploration-exploitation pace, better swarm: Examining the social interactions* in IEEE Latin American Conference on Computational Intelligence (LA-CCI), pp. 1–6, 2017, IEEE.
[3] **Macedo, M.** & Filho, C. *Clustering Users Based on the Capacity to Solve Questions in an Educational Platform*, in XIII National Conference in Artificial and Computational Intelligence (ENIAC), pp. 121–132, 2016.
[2] Silva, D. **Macedo, M.** & Filho, C. *A Fuzzy-Based Health Monitoring Mechanism for Energy Management of Swarm Intelligence Coordinated Unmanned Aerial Vehicles* in Brazilian Symposium in Intelligent Automation (SBAI), Oct. 2013.
[1] Silva, D. de Oliveira, L. **Macedo, M.** & Filho, C. *On the analysis of a swarm intelligence based coordination model for multiple unmanned aerial vehicles* in Robotics Symposium and Latin American Robotics Symposium (SBR-LARS), pp. 208–213, Oct. 2012.