

Caroline Mazini Rodrigues

PhD candidate in Computer Science

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Skills

Programming languages: Python, C / C++, Java.

Machine learning: Deep learning, explainable artificial intelligence (xAI), interpretability of neural networks, supervised learning, unsupervised learning, computer vision.

Machine learning tools: Pytorch, tensorflow, keras, captum, scikit-learn, pytorch-lightening.

Image processing tools: OpenCV, scikit-image, pillow.

Computational Theory and Mathematics: Signal mathematics, algorithms and complexity, rational languages theory.

Information Retrieval: Content-based image retrieval, text and image representation.

Research: Presentation, planning, creative problem-solving, teamwork, active listening, adaptability, analytical thinking.

Peer Review: Critically evaluate and provide constructive feedback on academic work.

Experience

Research and teaching associate, [Université Gustave Eiffel](#)

France 09/2023 - 09/2024

Temporary research associate and lecturer at a French university.

- Enhanced interpretability of CNN decisions by devising a method employing hierarchical segmentation strategies to identify crucial image components for the model.
- By teaching, I improved my communication proficiency and knowledge in topics such as Python/C programming, Image processing, and Databases to undergrad and master students.

Research in xAI, [EPITA](#)

France 09/2020 - 08/2023

PhD fellowship at EPITA ([LRE](#)).

- Developed two methods in the context of xAI. The first method aimed to enhance the interpretability of gradient-based xAI techniques by refining the visualization of important features, achieved through artificial class distancing with support regression networks. The second method, which was published in Information Science, presented a strategic framework for globally explaining CNNs through concept decomposition.
- By teaching courses to undergrad and master students I increased my proficiency in complex topics such as Signal Mathematics, Algorithms Complexity, Rational Languages Theory, and Python for Databases.

Data Scientist, [Neuralmind](#)

Brazil 02/2020 - 08/2020

Researcher at Neuralmind.

- Engaged in designing applications utilizing deep learning models for tasks such as image and text recognition and processing. I employed deep learning models within the image domain for object identification and bounding-box attributions. In the text domain, I used Transformers models to extract contextual information from unstructured texts.

Research in Complex Data Analysis, [University of Campinas \(Unicamp\)](#)

Brazil 02/2018 - 08/2020

FAPESP – São Paulo Research Foundation – Master's fellowship at [RECOD](#).

- I contributed a method to retrieve the most representative images from a collection of social media images obtained during a forensic event. This work was an integral part of the [DéjàVu](#) project's pipeline, which sought to comprehend forensic events using data from diverse sources. My contribution helped enhance the project's forensic capabilities by expanding its ability to analyze and interpret data effectively.
- During this period I made available three datasets that can be used for benchmarking: two involving forensic events and one from a general event.
- [Complex data mining](#) tutoring in extension course in the disciplines: Complex data mining regarding information retrieval, supervised and unsupervised learning. Tutoring in the undergraduate course: Algorithms and computer programming.

Education

PhD in Computer Science, [Université Gustave Eiffel](#)

France 09/2020 - 09/2024

Supervisors: Professor Laurent Najman ([LIGM](#)) and Dr. Nicolas Boutry ([LRE](#)).

MSc in Computer Science, [University of Campinas \(Unicamp\)](#)

Brazil 02/2018 - 08/2020

Supervisors: Professor Zanon Dias ([LOCo](#)) and Professor Anderson Rocha ([RECOD](#)).

Publications

Complete Journal Articles

- RODRIGUES, CAROLINE MAZINI; BOUTRY, NICOLAS; NAJMAN, LAURENT. Reasoning with trees: interpreting CNNs using hierarchies. Arxiv, 2024.
- RODRIGUES, CAROLINE MAZINI; BOUTRY, NICOLAS; NAJMAN, LAURENT. Unsupervised discovery of Interpretable Visual Concepts. Information Sciences, 2024.
- RODRIGUES, CAROLINE MAZINI; BOUTRY, NICOLAS; NAJMAN, LAURENT. Transforming gradient-based techniques into interpretable methods. Pattern Recognition Letters, 2024.
- RODRIGUES, C. M.; SORIANO-VARGAS, A.; BAHAM, L.; ROCHA, A.; DIAS, Z.. Manifold Learning for Real-World Event Understanding. IEEE Transactions on Information Forensics and Security. 2021.
- PADILHA, R.; RODRIGUES, C. M.; ANDALO, F. A.; BERTOCCO, G.; DIAS, Z.; ROCHA, A. . Forensic Event Analysis: From Seemingly Unrelated Data to Understanding. IEEE SECURITY & PRIVACY. 2020.

Conference Proceedings

- DOH, M.; RODRIGUES, C. M.; BOUTRY, N.; NAJMAN, L.; MANCAS, M.; BERSINI, H. Bridging Human Concepts and Computer Vision for Explainable Face Verification. BEWARE-23 Joint Workshop @ AIXIA, 2024.
- RODRIGUES, C. M.; BOUTRY, N.; NAJMAN, L. . Gradients Intégrés Renforcés. Explain'AI Conférence Francophone sur l'extraction et la gestion des connaissances (EGC). 2023.
- RODRIGUES, C. M.; PEREIRA, L. ; ROCHA, A. R. ; DIAS, Z. . Image Semantic Representation for Event Understanding. 2019 IEEE International Workshop on Information Forensics and Security (WIFS). 2019.
- RODRIGUES, C. M.; PITERI, M. A.; ARTERO, A. O.; ELER, D. M.; SILVA, F. A.; PEREIRA, D. R. . Facial Recognition in Digital Images using Local Binary Pattern Methods. XIII Workshop de Visão Computacional (WVC). 2017. v. 1.

Awards

Best presentation – PhD day MSTIC (2021).

Academic Merit, São Paulo State University – UNESP (2017).

Honorable Mention by presenting the work: Neper Number Origin Based on its Derivative – UFU (2015).

Events participation

EuADS Data Science for Explainable and Trustworthy AI. 2023. (Summer school).

Explain'AI (EGC) – Presentation “Gradients Intégrés Renforcés”. 2023. (Workshop).

Oxford Machine Learning Summer School (OxML). 2022. (Summer school).

École Jeune chercheur/r/se/s en Informatique Mathématique – Presentation “Visual xAI techniques”. 2022. (Summer school).

Latin American Meeting In Artificial Intelligence (KHIPU) – Presentation “Complex Data Relevance Analysis for Event Detection”. 2019. (Meeting).

Online Courses & Certifications

Speaking to inform: Discussing complex ideas with clear explanations and dynamic slides (Feb. 2022)
– University of Washington – Coursera.

Introduction to Public Speaking (Dec. 2021) – University of Washington – Coursera.

Practical Peer Review (May 2021) – Publons Academy.

Languages

Portuguese [Native] – **English** [Advanced] – **French** [Advanced] – **Spanish** [Basic] – **German** [Basic – Learning]