Caroline Mazini Rodrigues, MSc

PhD candidate in Computer Science

Expected degree 2nd Semester 2024

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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, generative AI.
Machine learning tools: Pytorch, tensorflow, hugging face, keras, captum, scikit-learn, pytorch-lightening, wandB.
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.

- I **advanced interpretability of CNN decisions** by devising a method employing hierarchical segmentation strategies to identify important 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).

- I **developed two methods in the context of xAI**. The first method, published in Pattern Recognition Letters, 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, 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.

- I designed applications using 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 to a **big data project** by proposing a method to retrieve the most representative images from a collection of **social media images** from forensic events. 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.
- I **curated three datasets** that can be used for benchmarking: two involving forensic events and one from a general event.
- I was a tutor in the Complex data mining 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 Zanoni Dias (LOCo) and Professor Anderson Rocha (RECOD).

BSc in Computer Science, *São Paulo State University (UNESP)* **Brazil** *02/2013 - 08/2017*
Exchange program participation: *University of Glasgow* **Scotland** *01/2016 - 06/2016*

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.; BAHRAM, 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 chercheu/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]