Francisco Mesquita *ML Engineer and Researcher*

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Skills

Languages
Portuguese (native), English (upper intermediate - B2)

Programming Languages
Python, SQL, C#

Programming Frameworks / Libraries
TensorFlow, OpenCV, Scikit-learn, HuggingFace, PyCaret, Pandas, Numpy, Matplotlib, Seaborn

Technologies
Machine Learning (ML), Deep Learning (DL), Explainable AI (XAI), Computer Vision, Docker, Git

Professional Experience

Machine Learning Engineer and Researcher, *University of Maia - ISMAI*   04/2022 – 03/2024   Porto, Portugal
- **Data scientist:** Analyzing data sourced from the municipality of Maia, implementing ML and DL models, and subsequently visualizing and communicating the findings effectively.
- **Researcher:** Exploring machine learning, particularly in image processing and Explainable Artificial Intelligence (XAI).
- **European project OMEGA-X**: Participation, monitoring and preparation of data for a common European Energy Data Space. ⊡

Invited Assistant Professor, *Polytechnic of Coimbra*   03/2023 – 08/2023   Coimbra, Portugal
Instructed practical sessions within the field of Electrical Circuits, covering various topics such as Ohm's law, electrical power, Kirchhoff's laws, Thévenin's and Norton's theorems, and other concepts.

Full Stack Web Developer, *Instituto Pedro Nunes*   09/2021 – 04/2022   Coimbra, Portugal
Development in a full-stack web application with Angular and .NET framework. Used Technologies: C#, Entity framework, Javascript, KendoUI, Microsoft SQL Server, Azure functions.

Scientific Publications

Depression detection using Deep Learning and Natural Language Processing techniques ⊡
F. Mesquita, J. Maurício, G. Marques - Springer, CIARP 2023: Progress in Pattern Recognition, Image Analysis, Computer Vision, and Applications.

Machine learning techniques to predict the risk of developing diabetic nephropathy ⊡
F.Mesquita, J. Bernardino, J. Henriques, JF. Raposo, RT. Ribeiro, S. Paredes - Springer, Journal of Diabetes & Metabolic Disorders.

Oversampling techniques for diabetes classification: A comparative study ⊡
F. Mesquita, J. Maurício, G. Marques - IEEE, EHB 2021: e-health and bioengineering conference.

Predicting Type 2 Diabetes Through Machine Learning: Performance Analysis in Balanced and Imbalanced Data ⊡
F. Mesquita, G. Marques - Springer, UNet 2021: International Symposium on Ubiquitous Networking.

Projects

Interpretation of Convolutional Neural Networks (CNNs) ⊡
Techniques tested and compared: GradCAM, Lime, Rise, Saliency maps, Anchor explanations, Activation maximization, Occlusion sensitivity, Guided backpropagation and Deep dream.

Interpretable heart disease Machine Learning classifier ⊡
Using ML on clinical data to predict heart disease in patients. The best model was the tuned Random Forest with 95.6% accuracy. The SHAP (SHapley Additive exPlanations) method was used to interpret these results.

Real-time drowsiness detection ⊡
Computer Vision system using OpenCV and YOLO network to detect drowsiness. It was used a custom dataset with manual image labelling. Transfer learning was used on the foundation model pre-trained on the COCO dataset.

Education

Computer Engineering, intelligent data analysis MSc Degree - 17 values, *Polytechnic of Coimbra*   2021 – 2023
- **Thesis:** Longitudinal ML modeling for Diabetic Nephropathy using data from patients followed for 22 years. Develop an end-to-end ML pipeline encompassing data preprocessing, model training, evaluation, statistical analysis, interpretability (XAI), and deployment. ⊡

Computer Engineering BSc Degree - 16 values, *Polytechnic of Coimbra*   2018 – 2021
- **Final project:** Android mobile application serving as a collaborative shopping list, integrating ML methods for real-time product recognition and classification via camera input. ⊡