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
LangChain, LangGraph, Azure ML, OpenAI API, Open-Source LLMs, Scikit-learn, PyCaret, TensorFlow, OpenCV, Gradio, Pandas, NumPy, Matplotlib, Seaborn

Technologies & Expertise
Machine Learning (ML), Deep Learning (DL), Generative AI, Explainable AI (XAI), AI Agents, Computer Vision, Optical Character Recognition (OCR), Docker, Git

Professional Experience

Machine Learning Engineer, *Flawless Workflow* 05/2024 – present
Remote, Netherlands
Applying AI on diverse products, projects, and process automation. Using Large Language Models (LLMs) in areas such as document processing, conversational applications, and task optimization, with a strong focus on multi-agent AI systems. Driving innovation by designing and developing product prototypes while contributing to projects across various industries.

Machine Learning Engineer and Researcher, *University of Maia - ISMAI* 04/2022 – 03/2024
Porto, Portugal
As a Data Scientist, I analyzed data from the municipality of Maia, implemented ML and DL models, and communicated findings. As a Researcher, I focused on the use of machine learning, image processing, and Explainable AI (XAI). Additionally, I participated in the European project OMEGA-X, preparing 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

An explainable machine learning approach for automated medical decision support of heart disease
F. Mesquita, G. Marques - Elsevier, Data & Knowledge Engineering (DKE) Journal

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.

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.