ANA SOUSA

AI Research Engineer

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Summary

I'm a ambitious engineer pursuing my passion and willing to improve. The ideal next step my career would be to contribute to the research/development of technologies that can improve people's lives. I really value being in an international/diverse and innovative environment that encourages the continuous development of personal skills and knowledge.

Work Experience

AI Researcher & Solution Developer

Bosch | **Braga, PT - 2023 - Present (1 year & 9 months)**

- Connected manufacturing project (Sensors, 5G and AI).
- Understand the whole system and provide the appropriate AI algos in the filed of Audio processing, MLops, efficient Pipeline creation for AI continues learning and deployment
- Support the SW team and develop software for process optimization/monitoring;
- Responsible for a Strategic project that aims to improve and continuously monitor production processes, using AI;
- Design and implement systems using AI/ML frameworks to meet client requirements and ensure high product quality. Responsibilities include tasks in computer vision, NLP, and multimodal applications, such as OCR and QA.

Keywords: *MLOps, Abnomaly Detection, Classification, Signal Processing,Tensorflow, Keras , HuggingFace*

Researcher

Section of Cognition, Data and Education | BMS faculty UT | **Enschede, NL - 2021-2023 (2 years & 2 months)**

- Domain translation of Clinical Neurophysiological research questions/needs into Data Science and ML/DL fields. This mediating capacity allowed successful collaboration of CoDE and CNPH groups, boosting the development of project and clinical validation.
- Publication of the developed unsupervised and semi-supervised deep learning pipelines for detection of EEG anomalies.
- Implementation and optimization of robust algorithm with a sensitivity of **81.9%** and a specificity of **91.7%**

Keywords*: EEG, Abnomaly Detection, Autoencoder, VAE, VAE-GANs, Diffusion Models, Gen AI, Signal Processing, Tensorflow*

Assistant Researcher *(Master's Thesis)*

Clinical Neurophysiology Group (CNPH) |TechMed Center UT | **Enschede, NL**

- Review of state-of-the-art approach for captioning in image/signal/video and Inspired on that development, troubleshooting and comparison of **6** pipelines for EEG captioning.
- Presentation and defense of the thesis before a prestigious jury composed of AI and neurologist experts, having obtained the grade of **19/20**, result of **excellence** (among **10%** of higher grades).
- **Awarded** for the performance in the master's thesis *"Learning to write medical reports from EEG data."* with a job position as Researcher.

Keywords: Attention models, Captioning, Classification, Video, Image, Time-series, Encoder-Decoder, NLP, Numpy, SciPy

Junior Researcher *(Erasmus+ Internship)*

Clinical Neurophysiology Group (CNPH) |TechMed Center UT | **Enschede, NL**

- Research and implementation of various data augmentation approaches, from traditional signal transformation to more complex data approach, generative models like GANs.
- Proposing the use of different forecasting models for data augmentation.
- Provided important insight into EEG properties and behavior/potential of different approaches, stimulated further research and emergence of new projects.
- Invited to develop a master's thesis at the institution, after obtaining the **Excellent** grade, **19/20** in this Erasmus+ internship, *"GANs and Data Augmentation Prediction Models in the Detection of Interictal Epileptiform Discharges (IEDs)"*.

Keywords: *Time-series, Biosignal, GANs, CNN, LSTM / GRU and hybrid models.*

Summer Internship

Visual Computing & Machine Intelligence Group | INESC Technology and Science | **Porto, PT - 2020-2021 (6 months)**

- Impact of facial dynamic fusion information & DBN in Drowsiness detector performance (AUTOMOTIVE proj).
- Collaboration with other master and PhDs students for the development of robust Drowsiness detector system to detect driver fatigue.

Keywords: *Computer Vision, Facial dynamic fusion , DBN, OpenCV, Scikit-learn*

Researcher Intern

Biomedical Imaging Lab from C-BER | INESC Technology and Science | **Porto, PT**

- Characterize lesions associated with lung cancer, using an annotated computed tomography dataset.

Keywords: *CT scans, Neural networks, Computer Vision, Image Segmentation*

Publications

- *Detection of Interictal epileptiform discharges with semi-supervised deep learning*
  Biomedical Signal Processing and Control, Volume 88, Part B, 2024
- Learning to write medical reports from EEG data,
  Masters dissertation. Faculty of Engineering of the University of Porto, 2022

Education

ERASMUS+ Internship

Institution: Faculty of Science and Technology, University of Twente

February 2022 to August 2022 — ***Final Grade:*** *19 / 20 (A)*

February 2021 to July 2021 — ***Final Grade:*** *19 / 20 (A)*

Bachelor & Master in Bioengineering - Biomedical Engineering

Institution: Faculty of Engineering, University of Porto

2017 - 2022 — ***Final Grade:*** *18 / 20 (A)*

Awards

3rd Place - World Data League 2023

Member of the team 'CEOS'. We finished the international competition in **3rd** place among **29** teams of best minds in Data Science.

Personal Projects & Independent Learning

This section highlights my primary interests in AI, where I have consistently advanced my knowledge and skills through self-study, Courses/ certifications. For more details, please visit my github repositories: **AMfeta99**

- ***Generative AI (Gen AI)***
- ***2D/3D Computer Vision***
- ***Natural language Processing & Large Language models***

Relevant projects:

- *TimeMetamorphy*: *Object Evolution Generator system powered by AI agents (ReAct, HuggingFace, Gradio)*
- *LM-vs.-Human-Minds*: *This game challenges humans to compete against LLM models in a variety of games. (LLM, LangChain, Ollama-api)*
- *Seizure Prediction in Intracranial EEG Recordings (Python, PyTorch, Scikit-Learn)*
- *Automated Cell Counting (Matlab)*
- *Brain Tumor Diagnosis App developed with Gradio. ViT fine-tuned for binary classification of brain scans (Transformer, HuggingFace, Gradio).*

Tech Skills

- **Most Used:** Python, Pandas, Numpy, Scipy, Scikit- Sklearn, Tensorflow, Keras
- **Frequently/Occasionally used:** HuggingFace, Transformer, Ollama, Langchain, HTML, CSS, SQL, XGBoost, LightGBM, Matlab, Pytorch, Flask, Gradio
- **Basic Knowledge:** C, C++, JavaScript, PHP, Arduino, Docker, Multisim

Soft Skills

- Adaptability, Creativity, Self-Drive
- Problem solver, Proactive, Resilience
- Empathy, Teamwork, Communication

Languages

- Portuguese (native)
- English (advanced)
- Spanish (beginner)
- Dutch (beginner)