



Miguel Caçador Peixoto

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● WORK EXPERIENCE

18/08/2023 – CURRENT Ovar, Portugal

R&D VISION MACHINE LEARNING ENGINEER (BOOST PROGRAM) BOSCH

The Boost Career Acceleration Program is a comprehensive 18-month experience aimed at enhancing the careers of 12 young professionals through diverse role assignments and personalized mentoring.

1- Computer Vision Engineer in the Digitalization Team, based in Ovar, Portugal
Crafting bespoke solutions for factory digitalization through a vision-based Industry 4.0 approach

2-Multimodal Machine Learning @ Hildesheim, Germany

01/05/2023 – CURRENT Braga, Portugal

RESEARCHER UNIVERSITY OF MINHO

Our collaboration with Bosch Car Multimedia focuses on advancing anomaly detection research specifically for industrial settings. This project utilizes core technologies including autoencoders, multimodal machine learning, and traditional image processing techniques.

01/01/2022 – CURRENT Braga, Portugal

RESEARCHER INSTRUMENTATION AND EXPERIMENTAL PARTICLE PHYSICS LABORATORY

Led and managed a team of 10 motivated students specializing in anomaly detection and quantum computing techniques, applied to high energy physics. Furthermore, my role encompassed both leadership responsibilities and active involvement across several domains, including:

Natural Language Processing & Recommendation Systems:

- Collaborated with SPAC Lab (Social Physics & Complexity) to pioneer a model capable of automatically diagnosing possible diseases based on patients' historical records from the Portuguese National Health Service. Additionally, we explored critical issues such as determining the prevalence of diseases in the population and evaluating the appropriateness of drug prescriptions.
- Used **HuggingFace Sentence-Transformers** and **Facebook Faiss** for similarity search.

Quantum Machine Learning (QML) - [Paper Submitted](#):

- Conducted an in-depth study comparing Quantum Machine Learning architectures with conventional shallow Machine Learning (ML) techniques.
- Developed a robust library, complete with a parallelization pipeline for optimized computation, comprehensive unit tests, continuous integration/continuous deployment (CI/CD) pipelines, and thorough documentation.
- Leveraged prominent quantum computing libraries such as **PennyLane** and **Qiskit**, in conjunction with conventional ML libraries like **Scikit-Learn**, **PyTorch** and **Optuna**.

04/2020 – 10/2021 Braga, Portugal

SUMMER INTERN INSTRUMENTATION AND EXPERIMENTAL PARTICLE PHYSICS LABORATORY

- Engaged in two impactful summer internships: [Advanced data analysis methods for dark matter research](#) (2020) and [Anomaly Detection as a Tool for Discovering New Physics at CERN's Large Hadron Collider](#) (2021)
- Learned from the basic building blocks of ML to doing hyper-parameter optimization pipeline for variational auto-encoders.
- Used **PyTorch Lightning**, **Tensorflow**, **XGBoost**, **Pandas**, **NumPy**, and **Optuna**.

06/2021 – 08/2021 Vila Real, Portugal

SUMMER INTERN SEGUROS FERNANDA CAÇADOR LDA.

Automation of Insurance Simulations:

1. Created a **Python API** that interacts with different insurance companies, using **Selenium** as a back-end.
2. Created a web interface using **Flask** and **JavaScript** that interacts with the API, and it's used to simulate various types of insurance by the end-user.

06/2018 – 07/2018

SUMMER INTERN BLEAM

- Sped up a 2-week manual job for adding a new language to a client's old website into a 1-day job by creating a simple **API** using **python**, **selenium**, and **beautiful soup**.
- Sped up a 1-week manual job for changing text into seconds by making a simple website-wide database replacement using regular expressions.
- Created websites using **WordPress** and custom themes.

● PUBLICATIONS

2022

Fitting a Collider in a Quantum Computer: Tackling the Challenges of Quantum Machine Learning for Big Datasets

Abstract:

Current quantum systems have significant limitations affecting the processing of large datasets and high dimensionality typical of high energy physics. In this work, feature and data prototype selection techniques were studied to tackle this challenge. A grid search was performed and quantum machine learning models were trained and benchmarked against classical shallow machine learning methods, trained both in the reduced and the complete datasets. The performance of the quantum algorithms was found to be comparable to the classical ones, even when using large datasets.

Frontiers in Artificial Intelligence - DOI: 10.3389/frai.2023.1268852

● EDUCATION AND TRAINING

Braga, Portugal

MASTER'S DEGREE IN INFORMATION PHYSICS (QUANTUM COMPUTING) University of Minho

Student Representative of my Master's Branch (Information Physics)

Thesis Theme: "Anomaly Detection as a Quality Control Tool in an Industrial Context"

Final grade 3.7/4 GPA

Braga, Portugal

BACHELOR'S DEGREE IN PHYSICS ENGINEERING University of Minho

[Association of Physics Students - NEFUM](#) (2019-2021):

Founded and managed the discord with 200+ members and a website. I was also part of the team organizing the national meeting of physics students, which 134 students attended. Additionally ran for president and lost by a margin of ~15% in the year 2022.

[Academic Debate Association:](#)

Developed my debate skills by going to soft skills developing sessions and debating with law students.

Final grade Average Score of 16.4 out of 20 | **Type of credits** ECTS | **Number of credits** 180

● **HONOURS AND AWARDS**

2021

UMinho University Award for the Initiation in Scientific Research – University of Minho

Used Variational AutoEncoders (VAEs) to build an anomaly detection system for detecting beyond the standard model events in high-energy physics. [[Media Link](#)]

07/2019

Empreende@Villa.Jovem-BILATECH – Vila Real Municipality

Won 1st place and prize money of 5k among 30+ finalists in the contest aimed at young entrepreneurs by developing an innovative business idea - Automating marketing and improving the online presence of companies via SEO.

08/2017

Meritorious behavior of social and scientific nature – Secondary School of Morgado De Mateus

Awarded 4 distinctions at the end of high school due to my participation in "[Project Rocket](#)" and my seminar on the Noble Prize of Physics 2017 promoted by [UTAD University](#).

● **LANGUAGE SKILLS**

Mother tongue(s): **PORTUGUESE**

Other language(s): **ENGLISH**