Hugo Simão Rocha Pereira

Nationality: Portuguese **Date of birth:** 24/08/2001

Phone number: (+351) 915885746

Email address: hugosimaopereira@gmail.com

LinkedIn: https://www.linkedin.com/in/hugosimaopereira/

Home: Campo, Valongo (Portugal)

WORK EXPERIENCE

GECAD - Research Group on Intelligent Engineering and Computing for Advanced Innovation Development – Porto, Portugal

City: Porto | **Country:** Portugal

Research Fellow

[01/06/2023 – Current]

During my academic and professional career, I joined the **GECAD** - Research Group in Knowledge Engineering and Decision Support, at the Higher Institute of Engineering of Porto (ISEP). As part of this collaboration, I actively participated in two international projects funded by the ITEA (Eureka Cluster Programme): RM4HEALTH and PROFIT.

The **RM4HEALTH** (Resource Management for Health) project had as its central objective to develop and implement innovative solutions based on Artificial Intelligence to optimize resource management in health institutions. Through the intelligent analysis of hospital data, the project sought to improve the allocation of professionals, equipment and infrastructures, promoting greater operational efficiency, reducing waiting times and contributing to the provision of more effective and patient-centered health care. The multidisciplinary approach of the project allowed the creation of intelligent decision support tools, with a direct impact on the sustainability of health systems.

The **PROFIT** (Proactive Process Optimization for the Factory of Tomorrow) project aimed at the digital transformation of industrial and hospital processes, with a special focus on traceability, monitoring and optimization of critical resources. In the hospital context, the project addressed challenges related to the management and sterilization of reusable medical devices, such as endoscopes, through the integration of sensors, decision support systems and AI algorithms. By combining real-time data analysis with predictive models, PROFIT has allowed a more proactive and efficient management of sterilization cycles, promoting greater safety, compliance and availability of medical devices.

As part of the projects in which I was involved, I actively contributed to the advancement of research and innovation in applied contexts, with a special focus on the health area. In both projects, I worked with several technologies, both at the level of Artificial Intelligence and Information Technologies, which allowed me to apply and deepen technical skills in real and demanding scenarios. In addition, I collaborated with multidisciplinary teams from several countries, which significantly enriched my experience as a researcher and strengthened my ability to work in international and collaborative contexts. In the course of these initiatives, I also participated in the preparation of several scientific articles and publications, contributing to the dissemination of the knowledge generated and to the advancement of the state of the art in the areas covered.

Prozis Tech – Maia, Portugal

City: Maia | **Country:** Portugal

Internship - Data Analyst

[03/2022 – 07/2022]

During my internship at **Prozis**, I developed a project focused on churn forecasting, that is, on identifying customers who are more likely to stop using the company's services - a relevant strategic challenge for customer retention and loyalty in various sectors of activity.

The main objective was to understand the factors that lead to the loss of customers, through the analysis of historical data and the detection of behavioral patterns that anticipate turnover. Based on this analysis, I developed two predictive Machine Learning models, using the logistic regression and random forest algorithms, in order to compare the performance of different approaches in churn prediction.

Although Prozis already monitors metrics such as the monthly percentage of churn, active and inactive customers, this project aimed to go beyond descriptive analysis, seeking to understand the underlying reasons for customer abandonment. The ability to predict at-risk customers in advance allows the company to adopt proactive retention strategies, significantly reducing the churn rate.

This project allowed me to apply knowledge of data science, predictive analysis and statistical modeling in a real business context, with a special focus on solving a problem of high commercial impact.

Final rating: 17

EDUCATION AND TRAINING

Master in Artificial Intelligence Engineering

ISEP - Instituto Superior de Engenharia do Porto [26/09/2023 – 11/07/2025]

City: Porto | **Country:** Portugal | **Website:** https://www.isep.ipp.pt | **Field(s) of study:** Artificial Intelligence Applied to Health | **Final grade:** 15.87 | **Thesis:** Advanced Artificial Intelligence Techniques for the Detection and Screening of Gastrointestinal Diseases

Activities and Academic Groups - First Year
During the first year, I participated in teamwork activities focused on multidisciplinary challenges, organized in 10 teams, each dedicated to a fixed theme. My team joined the health area, where we developed four practical challenges:

- **Challenge 1 - AnxietyDetect AI:** Development of a specialized system to identify anxiety disorders, using Drools and Prolog technologies. Rules and programming logic have been implemented to ensure the effectiveness and reliability of the system.
- **Challenge 2 - trIage:** Creation of an intelligent system for patient classification based on the color of the bracelets, combined with algorithms that designate hospitals according to criteria of distance and waiting time, optimizing the efficient distribution of patients.
- **Challenge 3 - DermaChat:** Development of a platform that diagnoses skin problems from images or textual descriptions, applying advanced Machine Learning techniques. The system includes a chatbot for user interaction and guidance, combining image processing and natural language.
- **Challenge 4 - Ambusybnc:** Multi-agent system for hospital management, where ambulances, vehicles and hospitals communicate autonomously to optimize the transport of patients and the allocation of resources in emergency situations.

More information available at: https://left-4-health.wordpress.com

Thesis Development - Second Year
As part of my master's degree, I developed an in-depth investigation focused on the **application of advanced artificial intelligence techniques for the diagnosis of gastrointestinal diseases**. This work was carried out in partnership with GECAD (Knowledge Engineering and Decision Support Group), within the scope of the international PROFIT project, which aims to optimize hospital processes through digitization and the application of AI.

My thesis explores the integration of computer vision and deep learning methods for the analysis of colonoscopies, a fundamental procedure for early detection and treatment of colorectal lesions. Colonoscopy, despite being the reference standard, strongly depends on the doctor's experience, which can cause variability in diagnoses and delays in detection. In addition, invasive biopsies, necessary for diagnostic confirmation, imply risks and discomfort for patients.

To overcome these challenges, I developed a system based on convolutional neural networks (CNNs) and segmentation models, such as ResNet, DenseNet, EfficientNet and Inception, which allows me to identify and classify gastrointestinal lesions with greater precision and consistency. The results show that hybrid models, which combine several architectures, surpass models based only on transfer learning, with the best performance recorded by the hybrid model ResNet + EfficientNet + DenseNet, reaching an accuracy of 86.67%. This hybrid approach is promising to support clinical decision-making, reduce diagnostic variability and reduce the need for invasive biopsies.

This project allowed me to consolidate technical skills in AI applied to health, collaborate with international teams and contribute to innovation in real hospital contexts, aligning scientific research with practical impact.

Final rating: 19

Bachelor's Degree in Information Systems for Management

Escola Superior de Tecnologia e Gestão [09/2019 – 02/2023]

Country: Portugal | **Website:** https://www.estg.ipp.pt/ | **Field(s) of study:** Information Systems for Business Management | **Final grade:** 13 | **Thesis:** Churn Prediction - Prozis Tech

The Degree in Information Systems for Management provides technical and scientific training, for the exercise of functions at the level of business management and information systems.

Several works and projects were carried out within the scope of some curricular units, taking into account the areas covered during the degree.

Within the UI design area, it was proposed that we carry out a project that aims at social responsibility and easy accessibility to all. The project consists of a mobile application in which it would be possible to make donations in a dynamic way. The application bridges the gap between those who are available to donate, that is, citizens, and organizations motivated to do so. All this in a dynamic way and rewarded all those around.

In the area of data analysis, the main objective of the practical work was to implement a complete data analysis process, which begins in the analysis of the problem and data, and ends in the training and production of Machine Learning models for decision support. The dataset provided detailed various information about a set of wines, including the origin, price and score given by some expert tasters, an exploratory data analysis was initially made in order to summarize the main characteristics of the same dataset and its variables. Subsequently, several problems were detected at the data level where it was necessary to correct and continue with the main objective of the work, which would be to create a Machine Learning model to support the decision.

In the area of software quality, it was proposed to carry out a project together with the computer engineering degree where the objective would be to verify the quality of software through continuous code inspection practices, define quality factors, metrics and measures, all this through continuous inspection within the context of software configuration management (SCM). All this was done through code produced by the degree in computer engineering where we were later responsible for submitting this product produced to continuous inspection test.

In terms of software development and object-oriented programming, it was proposed to carry out a project that consists of the development of a small and complex information system. The system was implemented in a hotel context, helping a certain user to supervise the inherent mobilities. This monitoring of movements between the other spaces of the hotel is carried out according to the body temperature of the individuals, so that it is possible to identify the routes of guests and employees, contributing to a better containment of the spread of possibly communicable diseases.

Certification

Kaggle [15/03/2022 – 15/05/2022]

Country: Portugal | **Website:** https://www.kaggle.com/

During the curricular internship, I had the opportunity to attend several specialized training courses, which allowed me to deepen knowledge in fundamental areas of data science, namely:

- SQL
- Data Cleaning
- Data Visualization
- Feature Engineering
- Machine Learning
- Python

High School

Escola Básica e Secundária do Padre Américo [09/2016 – 06/2019]

City: Campo, Valongo | **Country:** Portugal

LANGUAGE SKILLS

Mother tongue(s): Português

Other language(s):

English

LISTENING B2 **READING** B2 **WRITING** B1

SPOKEN PRODUCTION B2 **SPOKEN INTERACTION** B2

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

NETWORKS AND MEMBERSHIPS

GDRR - Grupo Dramático e Recreativo de Retorta
I am an active part of the Dramatic and Recreational Group of Retorta, where I regularly collaborate in the preparation and realization of theatrical shows and other cultural events. I have been especially involved in the areas of lighting and sound engineering, supporting the assembly, operation and tuning of light and sound systems. This work has allowed me to develop a sense of responsibility, attention to detail and ability to work as a team in an artistic and associative context.

Link: http://www.retorta.com/

OTHERS

Scientific Publications

During my time as a research scholarship holder at GECAD, I actively participated in several scientific projects, namely RM4HEALTH and PROFIT, developing and co-authoring scientific articles in the areas of remote health monitoring, explainable deep learning and computer vision applications for health. These publications reflect the contribution of my work in applied research and in the development of innovative solutions in artificial intelligence for the health sector.

RM4HEALTH Project

A Systematic Review on Wearable-enabled Remote Health Monitoring

- Springer Nature, 2025
- Systematic review of wearable technologies applied to remote health monitoring, with emphasis on integration with clinical decision support systems.

Enhancing Medication Adherence with Computer Vision: Object Detection Models for Pill Detection

- WorldCist 2025 – 13th World Conference on Information Systems and Technologies
- Application of object detection models to improve medication adherence through the automatic identification of tablets in images.

Supporting Elderly Care through an AI-driven and FHIR-based Remote Monitoring System

- DCAI 2024 – 21st International Conference on Distributed Computing and Artificial Intelligence
- Development of a remote monitoring system based on artificial intelligence and FHIR interoperability, focusing on the provision of care for the elderly.

Dissertation of the Thesis and PROFIT Project

An Explainable Deep Learning Architecture for the Detection of Gastrointestinal Lesions in Colonoscopy Images

- EPIA 2025 – 23rd Portuguese Conference on Artificial Intelligence
- Proposal of an architecture based on Deep Learning with Explainable AI techniques for the detection of gastrointestinal lesions in colonoscopy images.

Projects Developed in the Academic Path

Participation in the contest "From linear to circular ideas" and academic project "Find It", in which its main objective was to use the best that universities have, which are their students. The idea was to create a repository for sharing information between students and teachers. Within these projects, the concepts learned in software development, UI design, and UML were mostly applied.

Within the curricular unit of Seminar on Information Systems and Communication Skills, I also participated in a competition within the Technical and Higher School of Technology and Management where the objective was to develop a project in the field of social responsibility taking into account a business context. The content of the project that was taken to the competition was an application that combined with charities would make it easier to donate essential goods to needy families. In this way, companies and associations could associate and increasingly dynamize the spirit of donation of the population, making this action more dynamic and interactive.

Personal Skills and Talents

- Effective work in a multidisciplinary team
- Strong sense of responsibility and organization
- Adaptability and continuous learning
- Clear technical and scientific communication
- Attention to detail and analytical rigor
- Creativity in solving technical and cultural problems

TECHNICAL SKILL

Business Process Management | UI Design | Development | Database Management | ERP | Data Science | Machine Learning | Deep Learning | Explainable AI |

I have been developing skills in various areas of Information Technologies, both throughout my academic training and in the context of research.

Business Process Management and ERP

During the degree, I acquired fundamental knowledge about process management and business systems through curricular units such as:

- *Information Systems for Business Management*
- *Production Planning and Control*
- *Business Process Management*
- *Logistics*

These units allowed me to understand the importance of modeling, optimizing and digitizing organizational processes and their integration with ERP systems.

Database Management and Data Science

I developed skills in databases, focusing on SQL and R language, through the following units:

- *Data Base*
- *Information Extraction Techniques*
- *Data Analysis Methods and Techniques*

I worked with advanced queries, relational modeling and exploratory data analysis, having also addressed initial concepts of data mining.

UI Design and Software Development

I participated in the development of small applications as part of academic projects in units such as:

- *Programming Languages*
- *Object-Oriented Programming*
- *Software Design and Development*
- *Human-Computer Interaction*
- *Information Systems Analysis*

I used technologies such as HTML, XML and Java, and also addressed usability principles and user-centered design.

Machine Learning, Deep Learning and Explainable AI

As part of the master's degree and my participation in research projects at the GECAD center, I deepened skills in these areas, working with:

- Supervised and unsupervised models
- Deep neural networks (CNNs, RNNs)
- Explainable AI techniques, such as Grad-CAM, LIME and Integrated Gradients
- Practical application of these methods in projects related to health, energy efficiency and industry