Duarte Leão

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Summary

I am a dedicated engineer and researcher with a strong interdisciplinary background, holding a Master's in Electrical and Computer Engineering (specializing in Control, Robotics, and AI) and a Bachelor's in Mechanical Engineering from Instituto Superior Técnico, Lisbon. My Master's thesis, supervised by Professors Daniel Silvestre and Rita Cunha, tackled sensor fusion challenges using distributed and centralized observer designs for non-Gaussian noises. Professionally, I led AI development at Pairwire, a startup focused on optimizing consultants' work, where I designed cutting-edge NLP and GraphRAG solutions to automate consulting reports. I also contributed to AI initiatives at General Logistics Systems (GLS), developing high-performing models for customer classification and anomaly detection. As a graduate researcher at the Institute for Systems and Robotics (ISR), I honed my expertise in sensor fusion and state estimation, contributing to projects like FirePuma, which bridges theoretical insights with real-world applications. Beyond my technical roles, I have engaged in diverse AI-driven projects, from multi-agent reinforcement learning for cleaning robots to economic trade simulations, and have excelled in award-winning AI coding competitions. My work reflects a commitment to advancing AI technologies and applying them to complex real-world challenges.

Education

MSc in Electrical and Computer Engineering Sep 2022 — Dec 2024
Instituto Superior Técnico, Lisbon

- Specialization in Control, Robotics, and Artificial Intelligence. Portuguese final grade: 18/20.
- M.S. Thesis: Distributed and Centralized Observers for Sensor Fusion with Non-Gaussian Noises; Advisors: Prof. Daniel Silvestre and Prof. Rita Cunha.
- Coursework: Optimization and Algorithms (20/20), Deep Learning (19/20), Artificial Intelligence and Decision Systems (18/20), Processing Big Data (18/20), Applied Computer Intelligence (18/20), Machine Learning (17/20).

BSc In Mechanical Engineering Sep 2018 — Jul 2021
Instituto Superior Técnico, Lisbon

- Portuguese final grade: 15/20.
- Coursework: Probability and Statistics (18/20), Linear Algebra (17/20), Control Systems (17/20), Differential and Integral Calculus II (16/20).

Professional Experience

Research Fellow Jan 2025 — Present
Institute for Systems and Robotics (ISR), Lisbon

- Working on the AI-Radiologist project under the supervision of Prof. Carlos Santiago and Prof. Catarina Barata.
- Developing novel prototype-based approaches for training discriminative and generative models.
- Investigating methods for learning prototypes as distributions to enhance flexibility and explainability in discriminative models.
- Designing techniques to condition generative models on learned prototypical distributions.

AI Development Lead May 2024 — Feb 2025
Pairwire, Lisbon

- Led the development of AI solutions for automating the generation of consulting reports in the mergers and acquisitions sector.
- Worked extensively with LLMs to automate the generation of consulting reports, designing and implementing advanced NLP pipelines that incorporated techniques such as text filtering and Retrieval-Augmented Generation (RAG) to improve data retrieval and contextual relevance.
- Developed and integrated GraphRAG systems, leveraging knowledge graphs to enhance the reasoning capabilities of AI models in complex data scenarios.
- Developed document parsers utilizing Vision-Language Models (VLMs) and Optical Character Recognition (OCR) technologies to extract and process information from diverse document formats.

Machine Learning Engineer Dec 2023 — Jan 2025
General Logistics Systems (GLS), Lisbon

- Contributed to the development of GLS Portugal's and Germany's AI department.
- Worked on an NLP pipeline that incorporated a BERT model to extract the embedding of customer names and used additional deep learning methods to classify customers as either businesses or individuals. The model achieved 91% balanced accuracy.
- Developed an anomaly detection system to predict anomalies in parcel life cycles, using a two-stage model incorporating supervised regression to estimate expected event timings and logistic regression to classify potential claims, achieving 84% prediction accuracy.
- Gained hands-on experience with Azure ML, Github Actions and MLOps methodologies.
- Worked on the development of a general CI\CD infrastructure pipeline for future data science projects

Graduate Researcher Jan 2022 — Nov 2023
Institute for Systems and Robotics (ISR), Lisbon

- Worked on the FirePuma project under the supervision of Prof. Daniel Silvestre.
- Developed a sensor fusion algorithm utilizing the Wasserstein Barycenter approach to integrate data from multiple sources, when the noise is not necessarily Gaussian.
- Implemented a Bayes filter with polynomial approximation of probability density functions to facilitate state estimation for non-Gaussian noises.
- Implemented and integrated Characteristic Function filters in Model Predictive Controls to address pursuer-evader problems, accounting for non-Gaussian random walks of the evader.

Tutor Sep 2020 — Dec 2021
Lisbon

- Served as a tutor, specializing in mathematics, physics, and chemistry education for middle to high school students.

Projects and Awards

Multi-Agent Cleaning Robots. Developed a decentralized reinforcement learning system for autonomous cleaning robots, optimizing coordination and task efficiency. GitHub.

Video Sectioning via Clustering. Applied unsupervised learning techniques to segment Tour de France video footage by camera angle, improving automated scene recognition and categorization. GitHub.

Network Analysis of Trade Simulation. Created an agent-based model for simulating economic trade, with agents leveraging adaptive learning for strategic trading and feedback mechanisms, underpinned by Q-learning techniques. Analyzed trade network dynamics through time-series visualization of node metrics, degree distributions, and community detection, providing insights into network evolution and resilience. GitHub.

WattAI. Co-developed a smart HVAC control system using Deep Reinforcement Learning during a 24-hour hackathon. The system dynamically optimized energy efficiency while maintaining occupant comfort. GitHub.

Generative AI Competition. Participated on a Generative AI competition where I developed a model using deep learning techniques to predict whether an image of a person was real or artificially generated.

1st Place - 37th AI Cloudflight Coding Contest. Achieved first place by solving a complex Computer Vision task using PyTorch.

3rd Place - 36th AI Cloudflight Coding Contest. Secured third place in an NLP-focused challenge by implementing RNN-based sequence models in PyTorch for advanced text processing.

Volunteer

Comunidade Vida e Paz May 2021 — Jan 2022
Comunidade Vida e Paz, Lisbon

- Participated in the outreach program of Comunidade Vida e Paz, engaging with homeless individuals to provide meals, clothing, and hygiene kits.

Guardião do Oceano Oct 2021 — Dec 2021
Guardião do Oceano, Lisbon

- Participated in coastal clean-up initiatives, removing plastics and other waste to reduce pollution and protect marine life.

Skills

Programming	Python, MATLAB
Machine Learning Frameworks	TensorFlow, PyTorch, Scikit-learn, timm
Data Science & Visualization	Pandas, NumPy, OpenCV, Matplotlib, Seaborn
DevOps & MLOps	Azure ML, MLOps, Git, CI/CD Pipelines
Fields of Specialization	Computer Vision, Deep Learning, Machine Learning, Signal Processing, State Estimation, Statistical Analysis