DAVIDE GRIMALDI

MACHINE LEARNING ENGINEER | RESEARCH OPERATIONS ANALYST

CONTACTS

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STRENGHTS

- **Cross-Domain Agility**
  Successfully applied machine learning methodologies across diverse domains.
- **Team Collaboration**
  Collaborated cross-functionally with experts to drive AI product development from ideation to deployment.
- **Effective Research Translation**
  Bridged academic and applied research by translating models into usable tools.
- **Prototyping Excellence**
  Designed and implemented advanced, high-impact prototypes showcased at international fairs.

EDUCATION

Università di Catania
Bachelor's Degree in Computer Engineering

LANGUAGES

ITALIAN	**Native**
ENGLISH	**Proficient**

SUMMARY

Versatile and antifragile Machine Learning Engineer with end-to-end expertise in machine learning solution development, from data ingestion and model building to deployment and optimization. Skilled in machine learning, deep learning, optimization, and data-driven decision systems, with a strong track record in high-impact projects across food production, HoReCa sector, industry, defense, and research.

EXPERIENCE HIGHLIGHTS

Freelance 03/2019 - Present

Machine Learning Engineer

- Aquaculture Optimization: Built digital twin and time series models for fish farming cycles, growth, and optimal harvesting.
- Developed sales forecasting and collaborative filtering systems to optimize fish placement in push sales models.
- AI for Manufacturing (Mangini Group, Nicomac): Machine learning control models for capsule coating processes. Solutions showcased at ACHEMA and CPHI Milan.
- Cyber & Intelligence: Deep learning systems for malware detection and criminal network analysis, including full-stack interactive tools.
- Data-Driven Strategy (Ethos, Trentino Sviluppo): Recommender systems, shift optimization, economic impact modeling, and public fund redistribution simulations.
- Academic & Research (IULM, Semeion): Large-scale tourism data analysis, creation of models to estimate the placement of an accommodation facility in the area compared to the competition; modernization of neural models for interpersonal dynamics.

KEY SKILLS

TECHNICAL

Applied Machine learning · Reinforcement Learning · Deep Learning · Artificial Intelligence · Decision Science · Predictive Modeling · Optimization Algorithms · Mathematical Modeling · Digital twin · Computer Vision · API Development · Recommender Systems · Graph Algorithms · Big Data Analytics · Data Science · Databases · Time Series Analysis · Data Preparation · Cloud Applications · MLOps · Data Engineering

NON TECHNICAL

Technology Transfer · Research and Development · Prototyping · Project Managment · Agile Methodologies · Turoring · Technical Writing · LaTeX

PROGRAMMING LANGUAGES AND TOOLS

Python · Cython · Tensorflow · Pytorch · Pandas · Polars · Numpy · Scipy · Sklearn · Rust · SQL · C++ · C · Javascript · Java · C# · Git · GCP · MLflow

CERTIFICATIONS & COURSES

Agents Course Hugging Face
Hugging Face

Control Systems Analysis: Modeling of Dynamic Systems
University of Colorado Boulder

Neo4j Certified Professional
Neo4j

OpenCV Bootcamp
OpenCV University

Customer Analytics in Python
Udemy.com

TensorFlow Developer Certificate Bootcamp
Zero To Mastery Academy

Probability and Statistics for Business and Data Science
Udemy.com

Time Series Analysis in Python
Udemy.com

Optimization with Metaheuristics in Python
Udemy.com

Social Network Analysis(SNA) and Graph Analysis using Python
Udemy.com

Python for Finance and Algorithmic Trading
Udemy.com

LaTeX for Professional Publications
Udemy.com

The Ultimate Guide to Genetic Algorithms in Python
Udemy.com

PROJECTS

Prompt Engineering for SAM via Attention Maps 12/2024 - Present

Create prompt engineering technique for the Segment Anything Model (SAM) by leveraging interpretability algorithms applied to a trained classification NN. Attention maps generated from the NN are used as spatial prompts to guide SAM, enabling semantically meaningful segmentation without manual input. This approach aims to enhance the automation and accuracy of object segmentation by integrating model-driven insights into the prompt generation process.

AI and Engineering: Enhancing Machinery and Industrial Processes 01/2024 - Present

Development of advanced algorithms tailored to enhance the capsule coating process, employing techniques from reinforcement learning and machine learning control. Engineering of an algorithm to improve process efficiency, this innovation has been showcased at ACHEMA (World Forum for the Process Industries) and at CPHI Milan 2024. Development of an analytics system to monitor and analyze processes, including an anomaly detection system.

Machine learning for sales processes 06/2024 - 02/2025

This project focused on leveraging Machine Learning and Business Analytics to improve sales processes within a push sales model, specifically optimizing fish placement and maximizing revenue opportunities.
Sales forecasting models with a stratified approach: geographically, by type of selling point and filtered by type of fish. Sales segmentation was achieved through clustering techniques. This allowed for the identification of selling point characteristics, providing business analytics insights into their behavior.
Recommendation engine based on collaborative filtering, used for identifying opportunities for both upselling and cross-selling.

AI to optimize aquaculture production 06/2024 - 02/2025

Data preprocessing and exploration of data regarding fish sales and farming. Development of simulation and forecasting models for farming cycles, fish growth and fishing, development of a model to recommend the best time window to harvest the fish with respect to cost-opportunity parameters.

AI-Powered Indoor Air Quality Control: Smart Prototypes for Clean Room Environments 01/2024 - 06/2024

Developed two advanced prototypes that integrate computer vision, predictive modeling, and real-time control to monitor and optimize indoor air quality for clean room and smart building applications.
Key Highlights:
- Real-time object detection and air quality forecasting
- Intelligent pump optimization for energy efficiency and safety
- Dual anomaly detection (visual + variables)
- Simulation-based validation to support real-world deployment
These prototypes showcase the potential of AI-driven environmental control systems in settings such as hospitals, clean rooms, schools, and smart buildings.

Demo - Sales Data Analysis & Price Intelligence Platform 02/2024 - 04/2024

Business intelligence solution for sales optimization with pricing strategy.
Developed a comprehensive analytics platform to analyze sales transactions and optimize pricing strategies. Built end-to-end data pipelines to process Italian transport documents (DDT) and product cost data, creating actionable insights through:
• Automated price-cost discrepancy detection and trend analysis
• Machine learning clustering for product segmentation
• Network analysis for understanding sales flow patterns

PUBLICATIONS

When Audio Speaks Differently: A Deep Dive into Audio Anomaly Detection with Machine Learning

Medium.com

2025

https://medium.com/@davidegrimaldi92/when-audio-speaks-differently-a-deep-dive-into-audio-anomaly-detection-with-machine-learning-7b81f2033959

Beyond Static Routes: When Optimal Paths Expire

Medium.com

2025

https://medium.com/@davidegrimaldi92/beyond-static-routes-when-optimal-paths-expire-4b035fc4b278

VOLUNTEERING

Self-Directed

STEM Mentor & Tutor

03/2020 - 03/2022

Volunteered as a remote tutor for university
students during the COVID-19 pandemic, providing academic support in
STEM subjects via video calls and chat platforms.
Helped over 20 students improve academic performance, confidence, and exam
readiness during challenging remote learning conditions.

REFERENCES

Gianfranco Mancuso

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Bezawitalem Desse

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PROJECTS

Malware analysis and classification project for Italian military reference institution 04/2023 - 01/2024

Study, conversion, adaptation and testing of the Semeion custom deep learning models. High performance custom ensamble deep learning model deployment. Development of application with graphical interface with results visualizations. Study, implementation and testing of model retrain policies. Definition of control and validation rules on data provided. Malwares clustering using deep learning. Anomaly detection model for malwares.

AI and investigative analysis 04/2023 - 01/2024

Data preprocessing and exploration, study, conversion, adaptation and testing of custom models and related custom indices. Gaining of investigative insights leveraging deep learning and network analysis. Back-end development, front-end application with graphical interface with annexes interactive visualizations of the generated graphs and the indices obtained on them.

Restructuring Semeion MQ model: neural networks and interpersonal perception 08/2022 - 08/2023

Restructuring the MQ model created in the 1980s by Professor Massimo Buscema at the Semeion research center. The model used neural networks to simulate interpersonal perception. The aim here is to use new technologies and frameworks to modernize and extend the model of that time.

Research project on data analysis of the HORECA sector (for IULM University of Milan) 04/2023 - 07/2023

Preprocessing of a big amount (over 10 million rows) of data collected over the course of a year regarding all the accommodation facilities in the province of Trento. Data analysis. Creation of visualizations. Creation of models to estimate the placement of an accommodation facility in the area compared to the competition.

Data science and AI consultancy for a leading restaurant sector group 02/2022 - 02/2023

Pre-processing of managerial and commercial data. Data-driven analysis with machine learning tools. Presentation of test results with graphs and interactive visualizations. Personal allocation optimization with genetic algorithms and processing of possible shifts. Weekly forecast using deep learning techniques. Development of a data pipeline architecture to manage data flows and computational workloads on Google Cloud Platform. Dish recommendation system using deep learning.

Development of machine learning models aimed at improving decision-making processes in public administration 01/2020 - 06/2022

Managing, exploring and analyzing economical data of province of Trento. Preprocessing of great ammount of data: real world complicated, unbalanced and incomplete datasets. Spatial analysis by economic sectors on the province. Clustering analysis by municipality. Network analysis with the aim of identifying hubs and key nodes from an economic point of view. Retrospective analysis of public funds disbursed for research and development projects to companies by the province. Creation of model to identify what if scenarios for possible redistributions of funds based on budget indicators. Creation of model for classification of the financed companies on balance sheet performance profiles. Interactive graphics to give an overview on funds disbursed.