MARCO BORESTA *CURRICULUM VITAE*

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PROFESSIONAL EXPERIENCE

Institute for Systems Analysis and Computer Science at the Italian National Research Council - IASI, CNR   **Rome, Italy**
Post-doc research fellow   *February 2022 - pres.*

Participated in the following funded projects, applying machine learning and optimization techniques to problems related to circular economy, sustainability, and green supply chain management, and taking on various roles and responsibilities:

- *UISH - Urban Intelligence Science Hub for City Network (DIT.AD016.097)*
  Responsible for analyzing vast amounts of traffic data collected by sensors in smart cities to create simulators capable of generating realistic instances of traffic.

- *PIPER - Piattaforma Intelligente per l'Ottimizzazione di Operazioni di Riciclo (POR 2014-2020, co-founded by EU)*
  In collaboration with Professors and post docs at the CNR and DIAG Sapienza University of Rome, we worked on optimizing waste management operations for a leading company in Rome, reducing vehicle travel distance by 13%. I was responsible for the analysis of the data of the company, the conceptualization and implementation of the model, as well as the communication with the partners of the project and the presentation of the results.
  Additionally, I developed an ML-OR framework for sustainable pricing and capacity allocation in shared resource systems, leading the development and implementation, which resulted in a scientific paper currently under review.

- *ARPA - AUTONOMOUS AND FLEXIBLE MANUFACTURING AND AUGMENTED REALITY TECHNIQUES FOR PROCESSES AUTOMATION (PON 2014>20)*
  Partners: Mosmec, CRF-FCA, CNR
  Worked closely with CRF-FCA on analyzing and managing logistic risks through the application of predictive maintenance models. Through the analysis of a large dataset, I developed diagnostic models using advanced statistical and ML methods to support the enhancement of automation in manufacturing processes.

Spindox - aHead Research (former ACT Operations Research)   **Rome, Italy**
Machine Learning Research Engineer Part-time   *September 2018 - pres.*

Led and coordinated the development and implementation of procedures for data acquisition, integration, processing, and analysis, addressing complex real-world problems. My expertise includes the use of machine learning, optimization, and rule-based models, along with experience in specific projects employing text mining and web scraping techniques. Collaborated with clients at various stages to ensure alignment with business needs, leading code development, and supervising less experienced colleagues. My role in these projects demonstrates a blend of technical proficiency, leadership, and teamwork. Key projects include:

- Developed automated data procedures to manage a dataset of 32k customer service tickets, using machine learning techniques, vectorization, and clustering for topic extraction and semantic similarity. Configured an automated model to link specific queries to potential solutions from a client's FAQ repository, enhancing ticket resolution efficiency.

- Detected small defects on X-ray images of clothing for a leading fashion company: Designed, implemented, and deployed the algorithm, achieving < 2% false negatives and a < 15% false positive rate.

- Implemented advanced data procedures to optimize digital marketing operations for a medium-sized agency. Leveraged web scraping, text mining, and machine learning techniques to automate keyword generation and bidding processes, resulting in a 17-fold increase in daily managed keywords.

- Predicted macroeconomic variables using Machine Learning and statistical models: Led coding efforts and supervised colleagues as project coordinator. Served as the primary client liaison, ensuring effective communication and delivery of results.

In addition to my hands-on experience with data-driven solutions, I have participated in national and international projects, ensuring alignment with project goals and fostering collaboration across multiple stakeholders. These include:

- *MoDiag – Piattaforma per diagnostica precoce e non invasiva di malattie neurodegenerative (POR FESR LAZIO 2014-2020)*
  Coordinated various partners within the project to ensure timely delivery of deliverables and successful completion of the final demo. Led efforts to maintain alignment with project goals and foster collaboration across multiple stakeholders.

- *1-SWARM - Integrated development and operations management framework for cyber-physical systems of systems under the paradigm of swarm intelligence (Funded by European Union)*
  In this project involving several international partners, I concentrated on WP 5.2, focusing on predictive maintenance. My responsibilities included:
  - Analyzing a large volume of data from a production company and building a supervised ML model to recognize the fault state of the production machine.
  - Supervising master's thesis students, exploring alternative techniques like GANs for further insights.
  - Collaborating on the deliverable's writing, assisting in the DEMO creation, and actively participating in the final review day's presentation.

ROMA, 22/01/2024   *Marco Boresta*

Entropea Labs
London, United Kingdom
Data Scientist Intern
March 2018 - July 2018
Investigated the optimal control problem of an Organic Rankine Cycle (ORC) system using a Machine Learning-based approach. Explored the feasibility of a control system employing artificial neural networks to maximize the power generated by the ORC.

Peter's Food Service
Bedwas, Wales
Data Analyst Intern
September 2016 - October 2016
Analyzed large amount of data to produce insightful reports for management, aiding strategic decision-making and performance evaluation.

EDUCATION

Sapienza University of Rome
Rome, Italy
PhD in Operations Research
November 2018 - May 2022
Area of interest: continuous, gradient-based optimization; machine learning for simulation-based optimization.
Key projects:

- Developed a gradient estimation method using Gaussian kernel-filtered derivative and central finite differences, improving approximation error bounds and reducing error variance in derivative-free optimization, with promising numerical results in noisy settings
- Optimized resource allocation for low-acuity patients in Emergency Departments using simulation-based multiobjective optimization and neural network metamodels, enhancing efficiency and adaptability in real-world hospital settings

Sapienza University of Rome
Rome, Italy
Bachelor's and Master's Degree in Management Engineering, final grade: 110/110 cum laude
2013 - 2018
Curriculum: Optimization models and algorithms to support strategic and operational decision making.

PUBLICATIONS

Peer-Reviewed Articles in International Journals

- M. Boresta M, T. Colombo, A. De Santis, S. Lucidi, *Mixed Finite Differences Scheme for Gradient Approximation*. Journal of Optimization Theory and Applications. 2022
- D. Cacciarelli, M. Boresta, *What drives a donor? A machine learning-based approach for predicting responses of nonprofit direct marketing campaigns*. Journal of Philanthropy and Marketing (2021)
- A. Avancini, M. Boresta, et al. *Exercise Levels and Preferences in Cancer Patients: A Cross-Sectional Study*. International journal of environmental research and public health. 2020.
- R. Seccia, M. Boresta, et al. *Data of patients undergoing rehabilitation programs*. Data in brief. 2020.

Under review

- M. Boresta, D.M. Pinto, G. Stecca, *An Operations Research and Machine Learning Framework for Customer Cost Forecasting and Resource Optimization*
- M. Boresta, T. Giovannelli, M. Roma, *Managing low-complexity patients in Emergency Department through simulation-based multiobjective optimization accelerated by neural networks.*
- C.Coppola, M.Boresta et al., *Computational issues in Optimization for Deep networks*

Work in Progress

- M. Boresta, A.L. Croella, C. Gentile, G. Stecca et al., *Optimal Network Design for Municipal Waste Management: an Application to an Italian Metropolitan City*
- M. Boresta, C. Gentile, G. Stecca, *Automotive Supply Chain Optimization: A Perspective Function Approach to Nonlinear Network Design*
- M. Boresta, T. Colombo, A. De Santis, *Convolutional neural networks and multi-threshold analysis for contamination detection in the apparel industry.*

TEACHING

Cambridge Spark
Cambridge, UK
Teaching Fellow and Mentor - Freelance
August 2020 - February 2022
Taught and trained professionals and university students in Machine Learning and Data Science topics.
Mentored 10+ Cambridge PhD students and postdoctoral researchers in the application of data science tools in their research.

Sapienza University of Rome
Rome, Italy
Graduate Teaching Assistant - Optimization Methods for Machine Learning course
September 2019 - December 2020
Delivered several lessons for the *Optimization Methods for Machine Learning* course, a master's degree course for the students of Management Engineering and Data Science. My responsibilities consisted in preparing and delivering some lessons, preparing and grading a part of the exam and in helping the students during the office hours.

ROMA, 22/01/2024

FUNDED RESEARCH PROJECTS

- *Models and methods for the solution of challenging optimization problems*, 2021-2022. Funded by Sapienza University of Rome, Headed by G. Liuzzi
- *Augmented Lagrangian approaches for Large Scale Semidefinite Programming*, 2020-2022. Funded by Sapienza University of Rome, Headed by M. De Santis
- *Decomposition algorithms for quasi-variational inequalities and generalized Nash equilibrium problems*, 2019-2020. Funded by Sapienza University of Rome, Headed by S. Sagratella

ACHIEVEMENTS

- PhD Full scholarship awarded by Sapienza University of Rome, Department of Computer, Control and Management Engineering
- Awarded with the *Outstanding Graduate* honor, a title given by Sapienza University to the 400 best graduated students among the more than 18000 graduated in 2018 (top 2%).
- Recipient of one of only two Fondazione Sapienza thesis abroad scholarships for the 2017-18 school year.
- Admitted to and participated in the *honour program*, a set of courses, seminars, and activities for the 10 best students of the academic year. Received a full time scholarship covering the university annual fee. https://www.uniroma1.it/en/pagina/honours-programmes
- 2016 Winner of *EBEC, European Best Engineering Competition* (https://www.best.eu.org/competitions/welcome.jsp)

SKILLS AND PERSONAL INTERESTS

Core Competencies Operations Research, Machine Learning, Data Analysis.
Programming skills Python (advanced knowledge), MATLAB and AMPL (prior experience).
Python libraries Numpy, Pandas, Pytorch, Keras, OpenCV, Scikit-Learn, Prophet, SciPy, Gurobipy
Languages English: fluent. Italian: mother tongue.
Other Judo black belt instructor, improv performer, soccer player.
Fun fact Read over 300 books in the last ten years.

Consapevole delle sanzioni penali nelle quali incorro
per dichiarazioni mendaci

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