# MARTA MONACI

🏢 Department of Computer, Control, and Management Engineering Antonio Ruberti (DIAG), Rome, Italy

## EXPERIENCE

**Visiting PhD Researcher** Sep 2022 – Feb 2023
Copenhagen Business School, Denmark
Hosted by Professor Dolores Romero Morales

## EDUCATION

**PhD Program in Automatic Control, Bioengineering and Operations Research** Nov 2020 – Oct 2023
Sapienza Univerisity of Rome, Italy
Curriculum: Operations Research, Advisor: Prof. Laura Palagi

Thesis: *Interpretable Machine Learning: Leveraging SVMs to construct Optimal Decision Trees*

Research interests: Mixed Integer Programming, Interpretable Machine Learning, Optimal Decision Trees, Combinatorial Optimization, Reinforcement Learning applied to optimization problems.

**MSc in Management Engineering** Oct 2018 – Oct 2020
Sapienza Univerisity of Rome, Italy
Curriculum: Business Intelligence and Analytics

Main subjects: Operations Research, Combinatorial Optimization, Statistics,
Optimization methods for Machine Learning, Games and Equilibria

Thesis: *Solving Job Shop Scheduling via Deep Reinforcement Learning*
Advisors: Prof. Laura Palagi, Dr. Giorgio Grani (Research Institute Sintef, Oslo, Norway)

Grade: 110/110 cum laude

**Erasmus+ Program** Jan 2020 – Jun 2020
University of Strasbourg, France
Faculté des sciences économiques et de gestion (FSEG)

**BSc in Management Engineering** Oct 2015 – Oct 2018
Sapienza Univerisity of Rome, Italy
Grade: 110/110

## CONFERENCES and WORKSHOPS

**Optimization 2023** 24 - 26 Jul 2023
University of Aveiro, Portugal.
Delivered a talk titled: *A decomposition algorithm leveraging the SVM structure of Margin Optimal Trees*
Chair of the session: "Optimization and Machine Learning"

**NeEDS Workshop On the Latest Advances in Machine Learning to Deal with Complex Data** 1 Dec 2022
Copenhagen Business School, Denmark.
Delivered a talk titled: *Maximum Margin Optimal Decision Trees*

**Machine Learning NeEDS Mathematical Optimization series** 5 Oct 2022
Online.
Held a seminar titled: *Maximum Margin Optimal Decision Trees*

**19th Workshop on Advances in Continuous Optimization - EUROPT 2022**  29 – 30 Jul 2022
NOVA School of Science and Technology, Caparica, Portugal.
Delivered a talk titled: *Maximum Margin Optimal Decision Trees*

**6th AIROYoung Workshop - Operation Research and Data Science
in Public Services**  23 – 25 Feb 2022
Roma Tre University, Italy.
Delivered a talk titled: *Maximum Margin Optimal Decision Trees*

**ODS 2021 - International Conference on Optimization and Decision Science
on "Optimization in Artificial Intelligence and Data Science"**  14 – 17 Sept 2021
Sapienza Univerisity of Rome, Italy. Delivered a talk titled:
*An actor-critic algorithm with deep double recurrent agents to solve job shop scheduling*
Chair of the session "Machine Learning-based optimization"

**EURO 2021 Athens - 31st European conference for Operational Research**  11 – 14 Jul 2021
University of West Attica, Athens, Greece. Delivered a talk titled:
*An actor-critic algorithm with deep double recurrent agents to solve job shop scheduling*

**5$^{th}$ AIROYoung Workshop 2021 on "Optimization and Data Science:**  8 – 12 Feb 2021
**Trends and Applications"**
Attended online

**ODS 2020 – International Conference on Optimization and Decision Science on**  19 Nov 2021
**"Operations Research, Machine Learning and Analytics"**
Attended online

## PUBLICATIONS

**Articles published in journals:**

1. D'Onofrio, F., Grani, G., Monaci, M., and Palagi, L. (2023). *Margin optimal classification trees.* Computers & Operations Research, 161:106441. DOI: 10.1016/j.cor.2023.106441

2. Monaci, M., Agasucci, V., and Grani, G. (2023). *An actor-critic algorithm with policy gradients to solve the job shop scheduling problem using deep double recurrent agents.* European Journal of Operational Research, 312(3):910–926. DOI: 10.1016/j.ejor.2023.07.037

3. D'Onofrio, F., Monaci, M., and Palagi, L. (2023) *Optimization-based approaches for learning Optimal Classification Trees*, IFORS NEWS, 18:(1), pp. 5-7. URL: https://www.ifors.org/march-2023-issue/

**Pre-prints submitted to journals:**

4. Di Teodoro, G., Monaci, M., and Palagi, L. (2023). *Unboxing Tree Ensembles for interpretability: a hierarchical visualization tool and a multivariate optimal re-built tree.* Submitted to EURO Journal on Computational Optimization; currently under the second review. arXiv: 10.48550/arXiv.2302.07580

**Technical Reports:**

5. Coppola, C., Grani, G., Monaci, M., and Palagi, L. (2021). *Heuristics for the Traveling Salesperson Problem based on Reinforcement Learning.* Department of Computer, Control, and Management Engineering Antonio Ruberti Technical Reports. URL: http://users.diag.uniroma1.it/ biblioteca/it/node/6105

## TEACHING ACTIVITIES

**Teaching assistant**                                               Sep 2022 – Feb 2023
Sapienza University of Rome, Italy
Official tutor of the "Analisi Matematica I" course held in the Bachelor's Degree in
Management Engineering

**Teaching assistant**                                               Sep 2021 – Feb 2022
Sapienza University of Rome, Italy
Official tutor of the "Complementi di Matematica" course held in the Bachelor's Degree in
Management Engineering

**Co-Advisor of a MSc Thesis**                                       Mar 2021 – Oct 2021
Sapienza University of Rome, Italy
I had the opportunity to assist in the academic supervision of a MSc thesis titled:
*Heuristics for the Traveling Salesperson Problem based on Reinforcement Learning.*

## AWARDS

**Funding for Research Initiation Projects**                         2023
Sapienza University of Rome, Italy
Awarded funding to initiate research on the project:
*Making Interpretable Machine Learning possible: leveraging SVMs to construct Margin Optimal Trees*

**Funding for Research Initiation Projects**                         2022
Sapienza University of Rome, Italy
Awarded funding to initiate research on the project: *Maximum Margin Optimal Classification Trees*

**PhD Mobility Scholarship**                                         2022
Sapienza University of Rome, Italy
Awarded a PhD mobility scholarship to conduct a research period at Copenhagen Business School
under the supervision of Prof. Dolores Romero Morales

**Tutoring scholarship**                                             2022
Sapienza University of Rome, Italy
Awarded a working scholarship position at the I3S Department of Engineering as tutor assistant
for the "Analisi Matematica I" course

**Tutoring scholarship**                                             2021
Sapienza University of Rome, Italy
Awarded a working scholarship position at the I3S Department of Engineering as tutor assistant
for the "Complementi di Matematica" course

## SKILLS

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| **Core Competencies** | Operations Research, Machine Learning, Data Analysis |
| **Computer skills** | Python, R, AMPL, CPLEX, Gurobi, LaTeX, Microsoft Office |
| **Python Libraries** | Numpy, Pandas, Pytorch, Scikit-Learn, Seaborn, Matplotlib |
| **Languages** | English: advanced, Italian: mother tongue |