

MARTA MONACI

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 University 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 University 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 University 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 University 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***5th AIROYoung Workshop 2021 on “Optimization and Data Science: Trends and Applications”**

8 – 12 Feb 2021

Attended online

ODS 2020 – International Conference on Optimization and Decision Science on “Operations Research, Machine Learning and Analytics”

19 Nov 2021

Attended online

PUBLICATIONS

Articles published in journals:

1. Di Teodoro, G., Monaci, M., and Palagi, L. (2024). *Unboxing Tree Ensembles for interpretability: a hierarchical visualization tool and a multivariate optimal re-built tree*. Forthcoming in EURO Journal on Computational Optimization, page 100084, 2024. DOI: [10.1016/j.ejco.2024.100084](https://doi.org/10.1016/j.ejco.2024.100084)
2. 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](https://doi.org/10.1016/j.cor.2023.106441)
3. Monaci, M., Agasucci, V., and Grani, G. (2024). *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](https://doi.org/10.1016/j.ejor.2023.07.037)
4. 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/>

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 Sapienza University of Rome, Italy Official tutor of the “Analisi Matematica I” course held in the Bachelor’s Degree in Management Engineering	Sep 2022 – Feb 2023
Teaching assistant Sapienza University of Rome, Italy Official tutor of the “Complementi di Matematica” course held in the Bachelor’s Degree in Management Engineering	Sep 2021 – Feb 2022
Co-Advisor of a MSc Thesis Sapienza University of Rome, Italy I had the opportunity to assist in the academic supervision of a MSc thesis titled: <i>Heuristics for the Traveling Salesperson Problem based on Reinforcement Learning.</i>	Mar 2021 – Oct 2021

AWARDS

Funding for Research Initiation Projects Sapienza University of Rome, Italy Awarded funding to initiate research on the project: <i>Making Interpretable Machine Learning possible: leveraging SVMs to construct Margin Optimal Trees</i>	2023
Funding for Research Initiation Projects Sapienza University of Rome, Italy Awarded funding to initiate research on the project: <i>Maximum Margin Optimal Classification Trees</i>	2022
PhD Mobility Scholarship 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	2022
Tutoring scholarship 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	2022
Tutoring scholarship 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	2021

SKILLS

Core Competencies	Operations Research, Machine Learning, Data Analysis
Computer skills	Python, R, AMPL, CPLEX, Gurobi, L ^A T _E X, Microsoft Office
Python Libraries	Numpy, Pandas, Pytorch, Scikit-Learn, Seaborn, Matplotlib
Languages	English: advanced, Italian: mother tongue