

MARTA MONACI

EXPERIENCE

Postdoctoral Researcher Feb 2024 – Present

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

Sapienza University of Rome, Italy

Independent Research Assignment

Research on "Margin Optimal Decision Trees for the interpretation of black box

Machine Learning models"

Jan 2024

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

Sapienza University of Rome, Italy

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 – Jan 2024

Sapienza University of Rome, Italy

Curriculum: Operations Research, Advisor: Prof. Laura Palagi

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

Grade: Laude

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

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

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

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

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, 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 Report:

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>

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

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

Core Competencies

Operations Research, Machine Learning, Data Analysis

Computer skills

Python, R, AMPL, CPLEX, Gurobi, L^AT_EX, Microsoft Office

Python Libraries

Numpy, Pandas, Pytorch, Scikit-Learn, Seaborn, Matplotlib

Languages

English: advanced, Italian: mother tongue