Giorgio **Grani**

Contacts

Piazzale Aldo Moro 5,
00185 Rome, Italy

Building: CU002, Floor: 4,
Room: 3

+39 3898433581

g.grani@uniroma1.it

Research interests

Reinforcement Learning applied to optimization problems, Mixed Integer Optimization, Revenue Management.

Work Experience

2021-2022 (1y)	**Research fellow**	Sapienza University of Rome, Itay
	AI-based optimization algorithms for VRP, JSSP. NLP applications for the classification of documents. RL theory.	
2021-2022 (1y)	**Research scientist**	SINTEF, Oslo, Norway
	Creation and development of AI-based optimization algorithms. Applications in air traffic management, train scheduling, vehicle routing.	
2020-2021 (1y)	**Postdoctoral researcher in Optimization**	SINTEF, Oslo, Norway
	Creation and development of AI-based optimization algorithms. Applications in air traffic management, train scheduling, vehicle routing.	
2019 (6m)	**Tutor for foreign students**	Sapienza University of Rome, Italy
	Support for foreign students in the field of Industrial Engineering and Economics.	
2018-2020 (2y)	**Lecturer: Operations research laboratory**	Sapienza University of Rome, Italy
	The course was focused on LP modelling and on the utilization of optimization tools in standard software. Major topic: CPLEX and GuRoBi under AMPL and Python.	
2016-2017 (1y 2m)	**Operations research consultant**	Sabre Airline Solutions, Rome, Italy
	Creation and improvement of algorithms for the solution of revenue management problems for airlines. This includes online and post-departure models. Development of dynamic pricing software machine learning-based.	
2010 (4m)	**Production manager**	Pris Marmi S.r.L., Viterbo, Italy

Education

2016-2020	**ABRO doctorate program (Control theory, Bioengineering and Operations Research)**	Sapienza University of Rome
	Thesis title: Criterion Space Search Algorithms for Nonlinear Integer Multiobjective programs. Advisor: Prof.Laura Palagi	
2018 (4m)	**Visiting Scholar**	Polytechnique Montreal,Montreal,Canada
	Development of heuristics for the feasibility problem in the mixed integer formulation. Advisor: Prof. Andrea Lodi, Excellence chair Data Science for real time decision making.	
2016 (6m)	**Honors program**	Sapienza University of Rome
2014-2016	**Master degree in Management Engineering**	Sapienza University of Rome
	Curriculum with focus on Operations Research and Machine Learning. Grade: 110/110 cum laude. Thesis: Revenue management: a market-service decomposition approach for the sales based integer program. Advisor: Prof.Laura Palagi.	
2011-2014	**Bachelor degree in Management Engineering**	Sapienza University of Rome
	Grade: 110/110 cum laude. Thesis: USA gross product analysis using artificial intelligence. Advisor: Prof.Stefano Lucidi.	

Additional training

2019 (1w)	**First MINOA school** Mixed integer non linear optimization meets Data Science	Ischia, Italy
2018 (3d)	**CPLEX Workshop**	University of Montreal, Montreal, Canada
2017 (1w)	**Google Crash Course on Machine Learning** Tensor flow and Keras	Sapienza University of Rome
2017 (1w)	**Summer school on Optimization, Big data and Applications (OBA)**	Veroli, Italy

Publications

2021   **An actor-critic algorithm with deep double recurrent agents to solve the job shop scheduling problem**   Submitted
A greedy-like heuristic based on two incident LSTM modeles capable of learning on different size instance and which is competitive with the IBM's solver CPLEX.
https://arxiv.org/abs/2110.09076

2021   **Learning to Dispatch: Deep Reinforcement Learning and Graph Convolutional Neural Networks for the Train Dispatching Problem**   Accepted as a proceeding for RailBeijing 2021
An actor-critic A2C algorithm with GNN agents for train dispatching. Publicly available from November the 7th.

2021   **From cats to airspace – User involvement in the design of Machine Learning infused systems**   Accepted as a proceeding for CHIGreece 2021
A study on computer-human interaction for SESAR PJ09.

2021   **Heuristics for the Traveling Salesperson Problem based on Reinforcement Learning**   Technical report
Comparing Q-learning, Proximal Policy gradient and Phasic Policy gradient for the travelling salesperson problem.
http://users.diag.uniroma1.it/~biblioteca/it/node/6105

2020   **Solving the single-track train scheduling problem via Deep Reinforcement Learning**   Submitted
An algorithm that combines machine learning and optimization to solve the real-time problem of train dispatching.
https://arxiv.org/abs/2009.00433

2020   **Branching with Hyperplanes in the Criterion Space: the Frontier Partitioner Algorithm for Biobjective Integer Programming**   European Journal of Operational Research
An algorithm for finding the complete Pareto frontier of biobjective integer programming problems with a strict complexity bound.
https://doi.org/10.1016/j.ejor.2019.10.034

2019   **Profit optimization in one-way free float car sharing services: a user based relocation strategy relying on price differentiation and Urban Area Value**   Submitted
Application of price discrimination to a particular case of car sharing by adapting tools from classical Revenue Management, taking into account also relocation aspects. Technical report - DIAG Sapienza n. 04/2019
http://users.diag.uniroma1.it/~biblioteca/it/node/6085

2019   **A heuristic method to solve the Sales Based Integer Program for post-departure analysis in Airline Revenue Management systems**   Submitted
A new formulation based on a market-service decomposition that allows to solve large instances of SBIP using LP-based branch-and-bound paradigm. Technical report - DIAG Sapienza n. 05/2019
http://users.diag.uniroma1.it/~biblioteca/it/node/6088

Conferences attended as a speaker

| 2021 | **EURO 2021** | University of Western Attica, Athens, Greece |

| 2018 | **EurOPT 2018** | University of Almeria,Almeria, Spain |

| 2018 | **Optimization Days** | HEC, Montreal, Canada |

Annual conference organized by GERAD and CIRRELT.

| 2017 | **ODS Airo conference** | Sorrento, Italy |

National conference of the italian operations research society.

| 2017 | **AIROyoung workshop** | Sapienza University of Rome |

Computer skills

Java,	CPLEX,
Python,	GuRoBi,
C/C++,	matlab,
Julia,	bash,
SQL,	LaTeX,
Tensor Flow/ Keras,	Office,
AMPL,	Arena

Languages

Italian - fluent

English - fluent

French - highschool level

Norwegian - beginner