



Roberto Maria Rosati

Curriculum Vitae et Studiorum

Personal Information

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Brief summary

Roberto Maria Rosati is a PhD fellow at the Intelligent Optimization Lab, University of Udine, Italy, where he is supervised by Prof. Andrea Schaerf. His research interests concern the design of multi-neighborhood metaheuristics and matheuristics based on instance reduction for discrete optimization problems, and the integration of reinforcement learning into the above-mentioned search methods. He was invited as visiting student at the Artificial Intelligence Research Institute (IIIA-CSIC), in Barcelona, where he collaborated with Dr. Christian Blum, and at the Technical University of Vienna (TU Wien), where he worked with Priv.-Doz.Dr. Nysret Musliu.

Prior to his PhD, he worked from 2016 to 2020 as consultant and project manager at OverIT, a software company specialized in scheduling and routing systems for field service management, and was involved mainly in projects for large international clients in Europe and South America.

Scientific track record

Roberto Maria Rosati has worked on multi-neighborhood metaheuristics and matheuristics on a variety of real-world scheduling and timetabling problems, as well as on theoretical problems on graphs. The solver he and his coauthors designed was awarded the second prize in the International Timetabling Competition ITC2021, and obtained the best results on a new comparative study on 518 new instances that cover evenly the instance space (Van Bulck et al., 2023). The solver proposed for the solution, a

Simulated Annealing approach that makes use of a portfolio of six different neighborhoods, one of them (*PartialSwapTeamsPhased*) being a novel contribution, is described in Rosati et al. (2022b). He has worked also on the Multi-Neighborhood Simulated Annealing for the Minimum Interference Frequency Assignment Problem, that outperformed all previous results on most instances of a benchmark problem formulation. (Ceschia et al., 2022).

Furthermore, he has contributed on Construct, Merge, Solve and Adapt (CMSA), a novel matheuristic based on instance reduction. The designed method outperformed the state-of-the-art for the Maximum Disjoint Dominating Sets Problem (Rosati et al., 2023a), and got the best results on large-scale instances of a Bus Driver Scheduling Problem with complex break constraints (Rosati et al., 2022a). Ongoing work concerns the integration of reinforcement learning into multi-neighborhood local search (Ceschia et al., 2023b) and into the novel Multi-Constructor CMSA (Rosati et al., 2023b). Additionally, he is working on multi-neighborhood search and instance generation for the Home Healthcare Routing and Scheduling Problem (Ceschia et al., 2023a) and on feature-based tuning for the Bus Driver Scheduling Problem. He is expected to deliver his PhD thesis within October 2023 and to defend within February 2024.

Research & Work Experience

- 11/2020 - **Doctoral Fellow**, Università degli Studi di Udine, Udine, Italy
present Design of multi-neighborhood metaheuristics and matheuristics for combinatorial optimization applied to scheduling and timetabling problems.
Supervisor: Prof. Andrea Schaerf
- 09/2021 - **Visiting Student**, IIIA-CSIC, Barcelona, Spain
06/2022 Design of CMSA matheuristic for a variety of discrete optimization problems.
Supervisor: Dr. Christian Blum
- 06/2021 - **Visiting Student**, Technische Universität Wien, Vienna, Austria
08/2021 Solution of a real-world bus driver scheduling problem with complex break constraints.
Supervisor: Dr. Nysret Musliu
- 06/2020 - **Research Fellow**, Università degli Studi di Udine, Udine, Italy
10/2020 Design of a decision support system (DSS) for a vessel under flood or fire damage (SAFE research grant, POR – FESR program 2014–2020).
- 02/2016 - **IT Consultant & Project Manager**, OverIT S.p.A., Udine, Italy
04/2020 2020: Delivery of a field service management solution for a multinational manufacturer of home appliances in UK and Russia (remotely). Spoken language: English.
2019: Delivery of augmented reality tools for maintenance and virtual collaboration in photovoltaic plants (Spain) and high voltage grids (Italy). Spoken languages: Spanish and Italian.
2018 - 2019: Delivery of a field service management solution for clients based in Brazil operating in water distribution systems. Spoken language: Portuguese. 2018: Training, user acceptance tests, and go-live of a field auditing system for a company operating in electrical energy distribution, in Goiânia, Brazil. Spoken language: Portuguese.
2018: Delivery of a plant maintenance scheduling solution for a company based in Sweden, operating in the automotive industry. Spoken language: English.
2016 - 2018: Delivery of a supply chain management solution, for the branches located in Spain and Colombia of a multinational company in the energy & utilities. Spoken language: Spanish.

Education

- 2017 **Master's degree in Management Engineering**, University of Udine, Udine, Italy
(*joint double degree with FH Joanneum*)
Grade: 110/110
- 2016 **Master of Science in International Industrial Management**, FH Joanneum - University of Applied Sciences, Graz, Austria (*joint double degree with University of Udine*)
- 09/2014 - **Universidade de Vigo**, Vigo, Spain
- 02/2015 Semester abroad thanks to an Erasmus+ grant
- 2014 **Bachelor's degree in Management Engineering**, University of Udine, Udine, Italy
Grade: 110/110 cum laude
- 2011 **High School**, Liceo Scientifico Niccolò Copernico, Udine

Natural Languages

- Native Italian (mother tongue)
- Level C1 English (extensively studied and employed daily at work), Spanish (lived in Spain)
- Level B2 Portuguese (spent long times in Brazil for work)
- Level A2 German (lived in Austria), Vietnamese (Roberto's wife is a Vietnamese citizen)
- And... different levels of understanding of Neapolitan, French, Catalan, Galician and Friulan.

Programming Languages & al.

- Languages C, C++, Java, Python, SQL, PHP, R
- Optimization CPLEX, AMPL
- AAC json2run, irace
- Others Git, SoapUI, L^AT_EX, Unix Shell
- OS Linux, Windows

Awards and Grants

- ITC2021 2nd position in the International Timetabling Competition 2021 (Rosati et al., 2022b)
- ESA-SpOC 3rd position in the GECCO 2022 Space Optimization Competition (SpOC) organized by the Advanced Concepts Team (ACT) of the European Space Agency (ESA)
- TAILOR Roberto Maria Rosati was awarded a TAILOR grant, a project funded by EU Horizon 2020 research and innovation program under GA No 952215, to support his research stay at IIIA. Value of the grant: €14940.
- PhD Roberto Maria Rosati was awarded a PhD fellowship by the Italian Ministry of Education and Research.
- Erasmus+ Roberto Maria Rosati was awarded three Erasmus+ grants in his career, to support his research stay at TU Wien and his studies at FH Joanneum and University of Vigo.

Certificates

- GRE Quantitative Reasoning, grade: 169/170, obtained on: 21/11/2019
- GRE Verbal Reasoning, grade: 165/170, obtained on: 21/11/2019

TOEFL Grade: 102/120, obtained on: 03/08/2019

Others Italian driving license B (even though he prefers cycling and public transportation)

Other academic work

Master's thesis supervision, Edgardo Mauroner, Optimization of the activities of predictive maintenance on a single ship (2021)

Representative of the PhD Students for the PhD course of Industrial and Information Engineering, 2021-2023.

Volunteer work in support of the academic community

Member of program committee for LOD2023

Peer Reviews in indexed Journals and Conferences

Journal Of Scheduling (2022)

Computers & Operations Research (2021)

International Transactions in Operations Research (2022)

The 17th Learning and Intelligent Optimization Conference LION17 (2023)

The 9th International Conference on Machine Learning, Optimization, and Data Science (2023)

Presentations at conferences

2023 LOD2023 (Grasmere, UK), ODS2023 (Ischia, Italy) IFORS2023 (Santiago, Chile)

2022 AIxIA2022 (Udine, Italy), MIC2022 (Siracusa, Italy)

2021 PATAT2021 (Leuven, Belgium, held in 2022)

Other presentations and seminars

PhD Conference, Udine, Italy, 2021, 2022 & 2023

Phenikaa University, Hanoi (Vietnam), online seminar (6th April 2023)

Doctoral Consortium of the International Conference of the Italian Association for Artificial Intelligence (AIxIA2022), 2022, Udine, Italy

Publications

- Ceschia, S., Di Gaspero, L., Rosati, R.M., Schaerf, A., 2022. Multi-neighborhood simulated annealing for the minimum interference frequency assignment problem. *EURO Journal on Computational Optimization* 10, 100024.
- Ceschia, S., Di Gaspero, L., Rosati, R.M., Schaerf, A., 2023a. Multi-neighborhood simulated annealing for the home healthcare routing and scheduling problem. *Computers & Operations Research* [submitted].
- Ceschia, S., Di Gaspero, L., Rosati, R.M., Schaerf, A., 2023b. Reinforcement learning for multi-neighborhood local search in combinatorial optimization, in: *Machine Learning, Optimization, and Data Science. LOD 2023* (in press).
- Rosati, R.M., Bouamama, S., Blum, C., 2023a. Construct, merge, solve and adapt applied to the maximum disjoint dominating sets problem, in: *Metaheuristics: 14th International Conference, MIC 2022, Syracuse, Italy, July 11–14, 2022, Proceedings*, Springer. pp. 306–321.
- Rosati, R.M., Bouamama, S., Blum, C., 2023b. Multi-constructor CMSA for the maximum disjoint dominating sets problem. *Computers & Operations Research* [submitted].
- Rosati, R.M., Kletzander, L., Blum, C., Musliu, N., Schaerf, A., 2022a. Construct, merge, solve and adapt applied to a bus driver scheduling problem with complex break constraints, in: *International Conference of the Italian Association for Artificial Intelligence*, Springer. pp. 254–267.
- Rosati, R.M., Petris, M., Di Gaspero, L., Schaerf, A., 2022b. Multi-neighborhood simulated annealing for the sports timetabling competition ITC2021. *Journal of Scheduling* 25, 301–319.
- Van Bulck, D., Goossens, D., Clarner, J.P., Dimitras, A., Fonseca, G.H.G., Lamas-Fernandez, C., Lester, M.M., Pedersen, J., Phillips, A.E., Rosati, R.M., 2023. Which algorithm to select in sports timetabling? *Computers & Operations Research* [submitted] URL: <https://sportscheduling.ugent.be/Docs/WhichAlgorithmToSelect.pdf>.

References available upon request.