Marco Chiarandini

https://imada.sdu.dk/u/march

Scientific Career and Education

2011 - pres.	Associate Professor, Department of Mathematics and Computer Science (IMADA), Data Science and Statistics Group and Centre for AI Science and Applications, University of Southern Denmark, Odense
2008 - 2011	Assistant Professor at IMADA
2010 - 2010	Visiting Researcher at the Institute of Interdisciplinary Research and Development in Artificial Intelligence, Université Libre de Bruxelles.
2009	Teacher-Training Programme for Assistant Lecturers at University of Southern Denmark
2005 - 2008	Post-Doc researcher at IMADA
2001 - 2005	Ph.D. in Computer Science at the Darmstadt University of Technology, Germany.
1995 - 2000	Master in Management Engineering and Electronics at the University of Udine, Italy.

Scientific Focus Areas

Optimization in general with connections to Data Science and Artificial Intelligence • Applied Computing: Operations Research: Scheduling, Timetabling and Routing in the Industrial and Public Sector • Artificial Intelligence: Search, Learning and Experimentation Methodologies • Mathematics of Computing: Discrete Mathematics: Combinatorics: Combinatorial optimization • Graph Theory

Selected Research Projects and Academic Service

- Working Group Leader and Management Committee member in the COST action CA22137 (2023-2027).
- Second ranked in the international Integrated Healthcare Timetabling Competition 2024.
- Co-organized the workshop on models and algorithms for planning and scheduling problems (MAPSP), 2024, and the conference on the practice and theory of automated timetabling (PATAT), 2024.
- Local chair of a workshop on Constraint Programming of Nordic countries (NordConsNet), supported with 13K € by Danish Data Science Academy and Carlsberg Foundation (2023).
- Principal Investigator in a project for the development of e-health app for people with dementia, in collaboration with Nyborg Kommune, total budget 320K euro (2019-2022).
- Principal investigator in a project on Intelligent Traffic Systems in collaboration with Odense Kommune and supported by SDU with 150K Euro (2017-2019).
- Main supervisor in two Industrial PhD projects financed by InnovationFonden: on flight route optimization in collaboration with Aviation Cloud AS (2014-2017) and on long term planning in the energy sector in collaboration with DONG Energy (2008-2011).

Teaching and Advising

- 84 courses at Bachelor and Master level on Optimization and Artificial Intelligence.
- Completed: 3 PhD students, 42 Master thesis projects (60 ECTS) and 34 Bachelor projects (10-15 ECTS).

Bibliographic Overview

- Author of 12 journal articles, 26 conference papers, 6 book chapters. Editor of 1 book and 1 journal issue.
- ORCID • DBLP • Google Scholar Profile: h-index: 21 (14 since 2019).

Description of the research group

During the Internship, the student will be working directly with the main advisor, associate professor, Marco Chiarandini. His research expertise is in the field of Artificial Intelligence and Optimization, where he focuses on modeling aspects of heuristic and nature inspired algorithms, constraint programming and mixed integer linear programming. Beside his main interest in Optimization, Marco has also worked in data analysis using methods from statistics, machine learning. He has 20 years experience in teaching and advising students.

The student will be affiliated with the Data Science and Statistics (DSS) group of the Department of Mathematics and Computer Science of the University of Southern Denmark. The group combines expertise in computer science (data mining, machine learning, operations research, optimization, artificial intelligence, visualization), statistics (extreme value theory, Bayesian inference, multivariate analysis), and bioinformatics (analysis of biological networks and large-scale biomedical data). Researchers in the group are committed to design and evaluate methods for data analysis and strive to improve the way of understanding data and of gaining insights from data (visualization techniques, optimization). They apply data-driven techniques in practice to gain insights and to create knowledge and value in collaboration with other academic fields and with companies from both private and public sector.

The group has grown considerably in the latest years and counts currently 17 full time researchers, 8 postdocs and 23 PhD students.

Description of the work to be carried out by the student

The student is welcome to bring his or her own project of interest in the field of continuous or discrete optimization or, more broadly, of artificial intelligence.

Alternatively, below are two projects to which the student could be associated:

- Research on Education Management Tools. A multitude of combinatorial optimization problems arise in the context of education management: course timetabling, student sectioning, exam scheduling, student-project assignment, instructor assignment, group formation, etc. All these problems have been tackled in the past but there is room for improvement. Above all, the gap between theory and practice is hard to close because of a number of important details that theory has not yet regarded. In particular, the involvement of human in the loop is a necessary element to make such tools trustworthy. Examples of directions of research at the intersection between theory and practice are: preference collection, elicitacion and modelling to handle multiple criteria, fairness and individual differences; interactive tools; constraint verifications and explanations. Data at departmental and faculty size will be available to test the new solutions developed.
- Developement of general purpose, adaptive heuristic and nature inspired solvers using the API specification of the ROAR-NET, a currently running COST Action. The methods developed will be tested across different problems.

Additional information about the local arrangement

The Department of Mathematics and Computer Science (IMADA) will make available the work space and IT facilities to the student. This include access to the library system of the University of Southern Denmark (SDU) that has subscriptions to the main publishers in the fields of Mathematics and Computer Science. Additionally, IMADA hosts the e-Science center of SDU that manages UCloud a computing center that offers a dynamic digital research platform with a user-friendly graphical interface, simplifying access to interactive high-performance computing resources and tools. In particular, UCloud has varied computing resources ranging from single to multiple core CPU architectures, high throughout memory and NVIDIA's cutting-edge GPU architectures.

SDU Accommodation Office helps foreign employees, guests and students to find accommodation. The entry point is available online.

There is no additional funding planned. If needed, it is possible to apply for a Short Term Scientific Mission within the Cost Action ROAR-NET, either for adding an external visit or for supplementing the Species Scholarship.

The student seeking information and facts about moving to, working and living in Denmark, as well as can visit the web site Work in Denmark. The International Staff Office at SDU provides general help for international staff including organizing social events and reminding about the many local cultural activities and festivals.

Finally, Odense is the 3rd largest city in Denmark and provides the perfect combination of a historic city center with a modern urban field with car-free bike paths everywhere. Its location on the beautiful island of Funen is ideal with easy access by train or highway to the bigger cities of Aarhus and Copenhagen; direct trains take straight to Copenhagen airport in less than 2 hours. Since 1966 the city has been a university town, and strong collaborative ties are in place between the University of Southern Denmark and the many Danish and International corporations in the region. The University of Southern Denmark was established to create value for and with society.