



Daniele Catanzaro

Professor of Discrete Optimization

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Synopsis

2017 - Now Professor of Discrete Optimization (DO), UCLouvain, **Belgium**

2014 - 2017 Associate Professor of DO, UCLouvain, **Belgium**

2013 - 2014 Assistant Professor of DO, Rijksuniversiteit Groningen, **NL**

2010 - 2012 Visiting Researcher, Carnegie Mellon University, **USA**

2009 - 2013 Chargé de Recherches du FNRS, **Belgium**

2004 - 2008 Ph.D. in OR, Université Libre de Bruxelles, **Belgium**

1997 - 2003 MSc in CS Eng., Summa cum Laude, Univ. of Palermo, **Italy**

Overview

I am an applied mathematician and a computer scientist, currently appointed as Professor (“Professeur”) of Discrete Optimization at the [Center for Operations Research and Econometrics \(CORE\)](#) of the [Université Catholique de Louvain \(UCLouvain\)](#), Belgium.

I am particularly interested in the mathematical and computational foundations of discrete optimization as well as in both the geometric approach (polyhedral combinatorics, convex geometry, cutting plane algorithms) and in the algebraic approach (matroid and majorization theory and, more in general, optimization over partial ordered sets) to combinatorial optimization problems. Specific optimization problems I have worked on include: linear, nonlinear and uncertain network design problems, Steiner tree problems, coloring and covering problems, partitioning over particular classes of graphs, routing problems, (generalized versions of) the traveling salesman and the quadratic assignment problems, and nonlinear inverse problems.

I am deeply interested in solving optimization problems arising from practical applications, hence I often collaborate with scientists from other disciplines (e.g., biologists, medical doctors, engineers) to mathematically model and solve challenging problems arising from their domain of expertise. The theoretical analysis of such models and the need to solve them as efficiently as possible constitute a continuous source of inspiration for my research that spurs me to investigate the use of large scale optimization techniques, high performance computing, and massively parallel search algorithms to tackle and solve them as fast as possible.

So far, I have contributed to the following application areas: mathematics of evolution and computational phylogenetics, bioinformatics, machine learning, supply chain logistics, information and compression theory, and telecommunications. My research activities have been supported by the Belgian National Fund for Scientific Research, the Louvain Foundation, the U.S. National Institutes of Health, the Belgian American Educational Foundation (BAEF), the European Union COST Action, and the Marie Curie Fellowship.

From 2017 to 2019, I served the Faculty Board of the Louvain School of Management as a Chair of the Commission for the Bachelor Curriculum in Management Science and Business Engineering. I cared of the internal quality assessment of this curriculum (AEQES) and I supported its reform. I joined again the same commission in September 2020 as a member of the commission. As of May 2021, I joined the Advisory Board of the International Journal “Mathematical Methods in Economics and Finance” and as of July 2021 I am acting as an Associate Editor of Soft Computing. As of 2022, I serve the Canadian NSERC/CRSNG Civil, Industrial & Systems Engineering Evaluation Group for the 2023-2025 Discovery Grants Competition Cycle. In 2022, I will also serve as an expert for the ERC Horizon call HORIZON-MSCA-2022-PF-01.

Education & Academic Experience

- 08.2020 – Present Professor (Professeur) of Discrete Optimization at the Center for Operations Research and Econometrics (CORE) of the Université Catholique de Louvain (UCL).
- 02.2020 – 02.2020 Invited Researcher at the Institute for Systems Analysis and Computer Science of the Italian National Research Council (CNR), Rome, Italy.
- 05.2019 – 12.2020 Senior Research Leader in Digital Transformations at the Luxembourg Institute for Socio-Economic Research (LISER), the Grand Duchy of Luxembourg.
- 02.2018 – 03.2018 Invited Professor of Operations Research at the Department of Management of the University Ca Foscari of Venice, Italy.
- 05.2017 – 12.2019 Chair of the Commission for the Bachelor Curriculum in Management Science and Business Engineering, Louvain School of Management, Université Catholique de Louvain (UCL).
- 05.2017 – 09.2020 Associate Professor (Chargé de Cours à titre définitif) of Discrete Optimization at the Center for Operations Research and Econometrics (CORE) of the Université Catholique de Louvain (UCL).
- 09.2014 – 05.2017 Assistant Professor (Chargé de Cours à titre temporaire) of Discrete Optimization at the Center for Operations Research and Econometrics (CORE) of the Université Catholique de Louvain (UCL).
- 02.2013 – 08.2014 Assistant Professor of Discrete Optimization at the Department of Operations of the Faculty of Economics and Business of the University of Groningen, The Netherlands.
- 05.2012 – 05.2012 Visiting Researcher at the Laboratoire d'Informatique, de Robotique et de Microélectronique de Montpellier LIRMM-CNRS. Aim of the visit: collaboration on optimization models for computational phylogenetics.
- 03.2012 – 08.2012 Visiting Researcher at the Department of Biological Sciences of the Carnegie Mellon University, USA. I collaborated with **R. Schwartz** to develop mixed integer programming models to profile tumor progression over time via single-cell sequencing.
- 11.2010 – 04.2011 Visiting Researcher at the Tepper School of Business and at the Department of Biological Sciences of the Carnegie Mellon University, USA. I collaborated with **R. Ravi** and **R. Schwartz** to develop mixed integer programming models for the Steiner tree problem in the hypercube.
- 06.2010 – 06.2010 Visiting researcher at the Department of Computer Science and Biomedical Engineering of Reykjavik University, Iceland. I collaborated with **Bjarni V. Halldórsson** to develop mixed integer programming models for covering and coloring problems on specific classes of interval graphs.
- 05.2010 – 05.2010 Visiting researcher at the Department of Mathematics and Computer Science of the Freie Universität Berlin, Germany. Aim of the visit: increasing knowledge on inverse optimization problems related to metabolic networks at **A. Bockmayr**'s lab.
- 10.2010 – 10.2010 Visiting researcher at the laboratory of anthropology, genetics and peopling history (AGP), Department of Genetics and Evolution, of the University of Geneva (2010). Aim of the visit: investigating new optimization models for genomewide association studies.
- 10.2009 – 09.2013 Postdoctoral Researcher of the Belgian National Fund for Scientific Research (FRS-FNRS) affiliated to the Graphs and Mathematical Optimization Unit of the Computer Science Department of the ULB, Belgium.
- 02.2009 – 04.2009 Visiting Researcher at the Department of Statistics and Operations Research of the University of La Laguna, Spain. I collaborated with **J. J. Salazar-González** to develop mixed integer programming models for particular network design problems over a lattice of unrooted binary trees.

- 10.2004 – 10.2008 PhD candidate at the Unit of Graphs and Mathematical Optimization of the Université Libre de Bruxelles (ULB). My focus was on the study of specific network design and covering problems on specific classes of graphs arising from molecular phylogenetics and disease association studies. As a major contribution, I developed the current state-of-the-art MIP model for haplotype estimation under pure parsimony, characterized special classes of edge path incidence matrices of trees, and investigated the fundamental equations that describes unrooted binary trees (phylogenies). During my doctoral studies I spent 3 years at the Institute of Medicine and Molecular Biology of the ULB. I obtained the title of Doctor in Sciences under the supervision of **M. Labbé**.
- The committee for the doctoral defense included: **Michel Gendreau** (Polytechnic of Montreal), **Bernard Fortz** (ULB), **Raffaele Pesenti** (University of Venice), **Guy Latouche** (ULB), and **Patrick Mardulyn** (ULB).
- During my doctoral studies I achieved a number of scientific results published in A010-A011; A18; A21-A23; and R02.
- My doctoral studies have been supported (from 10.2005 to 09.2009) by the Belgian National Fund for Scientific Research (FRS-FNRS) via the prestigious grant “Aspirant FNRS”.
- 09.2003 – 09.2004 Marie Curie Fellow at IRIDIA, ULB. Grant HPRN-CT-1999-00106. Senior scientist in charge: **M. Dorigo**. My focus was on the design, implementation and tuning of metaheuristics for network design and timetabling problems.
- 09.1997 – 04.2003 Laurea in Computer Science Engineering, Summa cum Laude, University of Palermo, Italy, under the supervision of **R. Pesenti**. Subject of the master thesis: The timetabling problem. During the academic year 2002-2003 I had the possibility to perform extra muros studies at the Polytechnic University of Valencia, Spain, in the context of the Erasmus project.

Grants, Honorary Fellowships & Qualifications

During my doctoral and postdoctoral research activity I obtained the following grants and honorary fellowships:

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| USA | Visiting grant (9000\$) funded by the Carnegie Mellon University (CMU) via the U.S. National Institutes of Health awards 1R01CA140214 and 1R01AI076318. The grant contributed to cover the visit at the CMU during the period November 2010 – April 2011. |
| Belgium | Belgian American Educational Foundation (BAEF) Honorary Fellowship 2010-2011 for biomedical engineering researches in the USA. November 2010 – April 2011. |
| Belgium | Visiting grant (1000€) funded by the European Union COST Action. The grant covered the visit at the AGP lab of the Faculty of Sciences of the University of Geneva, Switzerland, during October 2010. |
| Belgium | Prize <i>Fonds Brachet</i> (1000€) funded by the Institute of Medicine and Molecular Biology (IBMM) of the ULB. The grant covered the expenses for the meeting <i>Future Directions in Phylogenetic Methods and Models</i> at the Isaac Newton Institute for Mathematical Sciences, Cambridge, United Kingdom, on December 17-21 2007. |

I hold the following

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|----------------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Academic Qualifications | 2020 | Abilitazione Scientifica Nazionale per Professore di Fascia I in Ricerca Operativa (Italian National Scientific Qualification for Full Professor of Operations Research). |
| | 2017 | Abilitazione Scientifica Nazionale per Professore di Fascia II in Ricerca Operativa (Italian National Scientific Qualification for Associate Professor of Operations Research). |
| | 2012 | Maître de Conférence (Assistant Professor) in France for Sections 26 (Applied Mathematics) and 27 (Computer Science). |
| Memberships & Equivalences | 2004 | Qualification as Belgian Civil Engineer. |
| | 2003 | National Qualification for the Italian Engineering Society. |

Research Funds

During my research activity I rose an overall amount of **545,500** euros via the following research projects:

2022-2025	Title	AEON, Advances in computational phylogenetics.
	Funds	234,000 euros.
	Source	The Belgian National Fund for Scientific Research (FRS-FNRS) via the call “Credits & Projects 2021” (ref. form 40007831).
	Role	Principal Investigator.
2018-2021	Title	COALESCENS, predictive models for precision oncology.
	Funds	140,000 euros.
	Source	Fondation Louvain, Université Catholique de Louvain.
	Role	Principal Investigator.
2017-2021	Title	Optimizing over unrooted binary tree: Bridging the gap between phylogenetics and coding theory
	Funds	151,000 euros.
	Source	Université Catholique De Louvain via the “Fonds Speciaux de Recherche 2017”.
	Role	Principal Investigator.
	Scope	This fund has supported Martin Frohn’s doctoral studies.
2017-2018	Title	Optimizing over unrooted binary tree.
	Funds	20,500 euros.
	Source	The Belgian National Fund for Scientific Research (FRS-FNRS) via the grant “Crédit de Recherche” ref. S/25-MCF/OL J.0026.17.
	Role	Principal Investigator.

Scientific Production

My scientific production involved the following topics:

Discrete Optimization	Polyhedral combinatorics; integer linear and nonlinear programming; computational complexity; submodularity; impact of ordering in discrete optimization; optimization on lattices; majorization; network design; quadratic assignment; optimization under uncertainty; large scale enumeration problems; design and development of large scale exact and approximate solution algorithms for practical problems.
Algorithms, Information Theory & HPC	Design and development of algorithms for combinatorial problems on graphs; subgraph and supergraph problems; mathematical results in combinatorics and graph theory; constructive characterizations of the solutions to specific combinatorial optimization problems on graphs. Massively parallel search algorithms; high performance computing; specific topics in data compression and encryption; information theory.
Phylogenetics, Tumor Evolution & Medical Bioinformatics	Distance methods in phylogenetics; Design of ad hoc estimation models for molecular evolution and phylogenetics; consistency analysis; combinatorics of phylogenetics; information entropy in phylogenetics; cancer phylogenetics. Design of mathematical models and estimation algorithms for genome-wide association studies.

A possible classification of my works is the following:

Category	Published and Accepted Articles in International Scientific Journals
Network Design / Phylogenetics	A01. D. Catanzaro, M. Frohn, O. Gascuel, and R. Pesenti. <i>A Tutorial on the Balanced Minimum Evolution</i> . European Journal of Operational Research, 300(1): 1-19, 2022. Invited article.
	A02. D. Catanzaro, R. Pesenti, and L. Wolsey. <i>On the Balanced Minimum Evolution Polytope</i> . Discrete Optimization, accepted, 2020. Contribution: I contributed to conceive the work and to write the article, implemented

the models/algorithms, and performed computations. Part of this work has been presented at ISMP 2018.

- A03. D. Catanzaro and R. Pesenti. *Enumerating Vertices of the Balanced Minimum Evolution Polytope*. Computers and Operations Research, 109, 209-217, 2019.
Contribution: I contributed to conceive the work and to write the article, implemented the models/algorithms, and performed computations.
- A04. D. Catanzaro, S. E. Shackney, A. A. Schäffer, and R. Schwartz. *Classifying the progression of ductal carcinoma from single-cell sampled data: A case study*. IEEE/ACM Transactions in Computational Biology and Bioinformatics, 13(4):643–655, 2016.
Contribution: I contributed to conceive the work and to write the article, implemented the models/algorithms, and performed computations.
- A05. D. Catanzaro, R. Aringhieri, M. Di Summa, and R. Pesenti. *A branch-price-and-cut algorithm for the minimum evolution problem*. European Journal of Operational Research, Accepted, 2015.
Contribution: I contributed to conceive the work and to write the article, implemented the models/algorithms, and performed computations.
- A06. D. Catanzaro, R. Ravi, and R. Schwartz. *A mixed integer linear programming model to reconstruct phylogenies from single nucleotide polymorphism fragments under the maximum parsimony criterion*. BMC Algorithms for Molecular Biology, 8:3, 2013.
Contribution: I contributed to conceive the work and to write the article, implemented the models/algorithms, and performed computations.
- A07. D. Catanzaro, M. Labbé, R. Pesenti, and J. J. Salazar-González. *The balanced minimum evolution problem*. INFORMS Journal on Computing, 24(2), 276-294, 2012.
Contribution: I contributed to conceive the work and to write the article, implemented the models/algorithms, and performed computations. This article describes the current state-of-the-art MIP model for the BMEP.
- A08. R. Aringhieri, D. Catanzaro, and M. Di Summa. *Optimal solutions for the balanced minimum evolution problem*. Computers and Operations Research, 38(12), 1845–1854, 2011.
Contribution: I contributed to conceive the work and to write the article.
- A09. D. Catanzaro, E. Gourdin, M. Labbé, and F. A. Özsoy. *A branch-and-cut algorithm for the partitioning-hub location-routing problem*. Computers and Operations Research 38(2), 539–549, 2011.
Contribution: I contributed to conceive the work and to write the article, implemented the models/algorithms, and performed computations.
- A10. D. Catanzaro, M. Labbé, R. Pesenti, and J. J. Salazar-González. *Mathematical models to reconstruct phylogenetic trees under the minimum evolution criterion*. Networks 53(2), 126–140, 2009.
Contribution: I contributed to conceive the work and to write the article, implemented the models/algorithms, and performed computations.
- A11. D. Catanzaro. *The minimum evolution problem: Overview and classification*. Networks 53(2), 112–125, 2009.
Contribution: I conceived the work and wrote the article.
- A12. L. Porretta, D. Catanzaro, B. V. Halldórsson, and B. Fortz. *Branch&Price Algorithm for the Minimum Cost Clique Cover Problem in Max-Point Tolerance Graphs*. 4OR, 17(1), 75-96, 2019.
- A13. D. Catanzaro and C. Engelbeen. *An integer linear programming formulation for the minimum cardinality segmentation problem*. Algorithms 2015, 8(4), 999-1020, 2015.
Contribution: I contributed to conceive the work and to write the article, implemented the models/algorithms, and performed computations.
- A14. D. Catanzaro, M. Labbé, and B. V. Halldórsson. *An integer programming formulation of the parsimonious loss of heterozygosity problem*. IEEE/ACM Transactions in Computational Biology and Bioinformatics, 10(6), 1391-1402, 2013.

Overview of the scientific production

	Area	Name of the Journal	Number of Articles
International Journals	Operations Research	European Journal of Operational Research	3
		Computers and Operations Research	5
		INFORMS Journal on Computing	2
		International Transact. in Operational Research (Invited Art.)	1
		Networks	2
		Discrete Applied Mathematics	2
		Discrete Optimization	1
		Operations Research Letters	1
		Optimization Letters	1
		Algorithms	1
	4OR	1	
	Bioinformatics	Bioinformatics	1
		PLoS One	1
		BMC Evolutionary Biology	1
		Human Immunology	1
Evolutionary Bioinformatics		1	
IEEE/ACM Trans. in Computational Biology and Bioinf.		2	
BMC Algorithms for Molecular Biology	1		
Bibliometrics	Total number of articles on international journals	28	
	Scopus	Click here	
	Google Scholar	Click here	
	Thomson Reuters	Click here	
Authorship Information	Number of articles as a single author	1	
	Number of articles as a first author	23	
	Number of invited articles	2	
Minor Works	Theses	3	
	Book Chapters	1	
	Technical Reports	3	
	Conference Proceedings	2	
	Posters in Conferences	2	
Talks	International Conferences	29	
	Invited Talks	35	

Contribution: I contributed to conceive the work and to write the article, implemented the models/algorithms, and performed computations.

- A15. D. Catanzaro, M. Labbé, and L. Porretta. *A class representative model for pure parsimony haplotyping under uncertain data*. PLoS One 6(3): e17937, 2011.

Contribution: I contributed to conceive the work and to write the article.

- A16. D. Catanzaro, M. Andrien, M. Labbé, and M. Toungouz-Nevegnisky. *Computer-aided human leukocyte antigen association studies: A case study for psoriasis and severe alopecia areata*. Human Immunology 71(8), 783–788, 2010.

Contribution: I contributed to conceive the work and to write the article, implemented the models/algorithms, and performed computations.

- A17. D. Catanzaro, A. Godi, and M. Labbé. *A class representative model for pure parsimony haplotyping*. INFORMS Journal on Computing 22(2), 195–209, 2010.

Contribution: I contributed to conceive the work and to write the article, implemented the models/algorithms, and performed computations. This article describes the current state-of-the-art IP model for the PPHP.

- A18. D. Catanzaro and M. Labbé. *The pure parsimony haplotyping problem: Overview and computational advances*. International Transactions in Operational Research 16(5), 561–584, 2009 (Invited article).

Contribution: I contributed to conceive the work and to write the article.

Robust Optimization

- A19. D. Catanzaro, M. Labbé, and M. Salazar-Neumann. *Reduction approaches for robust shortest path problems*. Computers and Operations Research, 38(11), 1610–1619, 2011.

Contribution: I contributed to conceive the experiments and to write the article.

- A20. D. Catanzaro, M. Labbé, and R. Pesenti. *The balanced minimum evolution problem under uncertain data*. Discrete Applied Mathematics, 161(13-14), 1789-1804, 2013.
Contribution: I contributed to conceive the work and to write the article, implemented the models/algorithms, and performed computations.
- Heuristics A21. D. Catanzaro, R. Pesenti, and M. C. Milinkovitch. *An ant colony optimization algorithm for phylogenetic estimation under the minimum evolution principle*. BMC Evolutionary Biology 7:228, 2007.
Contribution: I contributed to conceive the work and to write the article, implemented the models/algorithms, and performed computations. Highly accessed.
- Systems Theory / Models of Molecular Evolution A22. D. Catanzaro, R. Pesenti, and M. C. Milinkovitch. *A non-linear optimization procedure to estimate distances and instantaneous substitution rate matrices under the GTR model*. Bioinformatics 22(6), 708–715, 2006.
Contribution: I contributed to conceive the work and to write the article, implemented the models/algorithms, and performed computations.
- A23. L. Gatto, D. Catanzaro, and M. C. Milinkovitch. *Assessing the applicability of the GTR model through simulations*. Evolutionary Bioinformatics 2, 153–163, 2006.
Contribution: I contributed to conceive the work and to write the article, implemented the models/algorithms, and performed computations.
- Routing A24. D. Catanzaro, M. Labbé and L. E. N. Gouveia. *Improved Integer Linear Programming Formulations for the Job Sequencing and Tool Switching Problem*. European Journal of Operational Research, 244(3), 766–777, 2015.
Contribution: I contributed to conceive the work and to write the article, implemented the models/algorithms, and performed computations.
- Partitioning A25. D. Catanzaro, R. Pesenti, R. Ronco. A new fast and accurate solution approach for the automatic scene detection problem. Computers and Operations Research, accepted, 2021.
Contribution: I contributed to conceive the work and to write the article, implemented the models/algorithms, and performed computations.
- Graph Theory A26. D. Catanzaro, S. Chaplick, S. Felsner, B. V. Halldórsson, M. M. Halldórsson, T. Hixon and J. Stacho. *Max Point-Tolerance Graphs*. Discrete Applied Mathematics, 216(1): 84-97, 2017.
Contribution: I contributed to conceive the work and to write the article.
- Information Theory A27. D. Catanzaro, M. Frohn, and R. Pesenti. *An information theory perspective on the Balanced Minimum Evolution Problem*. Operations Research Letters, 48(3): 362-367, 2020. Part of this work has been presented at ISMP 2018.
- Cutting Plane Methods A28. D. Catanzaro, S. Coniglio, and F. Furini. *Separating cover inequalities of maximum depth*. Optimization Letters, 2021, to appear.

Journal Articles Submitted or in Preparation

- Submitted S01. H. Dehaybe, D. Catanzaro, and P. Chevalier. A deep reinforcement learning approach for the stochastic inventory problem. Submitted to the European Journal of Operational Research, 2022.
- S02. D. Catanzaro, R. Pesenti, and R. Ronco. Job scheduling under time-of-use energy tariffs for sustainable manufacturing: A survey. Submitted to the European Journal of Operational Research 2022.
- Working Papers W01. D. Catanzaro, R. Pesenti, and L. Wolsey. Characterizing path-length matrices of unrooted binary trees.
- W02. D. Catanzaro, M. Frohn, O. Gascuel, and R. Pesenti. A massively parallel exact solution algorithm for the balanced minimum evolution problem.

W03. D. Catanzaro and A. Gasparin. A deep reinforcement approach for the balanced minimum evolution problem.

W04. D. Catanzaro and R. Pesenti. The pure parsimony estimation problem.

Long Term
Researches

LT01. D. Catanzaro. Greed and majorization in discrete optimization.

Chapters in Books, Theses, Conference Proceedings and Other Publications

Chapters
in Books

BC01. D. Catanzaro. *Estimating phylogenies from molecular data*. In *Mathematical approaches to polymer sequence analysis and related problems*, R. Bruni (Editor), Springer, New York, 2010. ISBN: 978-1-4419-6799-2.

Contribution: I conceived the work and wrote the chapter.

Theses &
Dissertations

TD01. D. Catanzaro. *Models and methods in molecular phylogenetics*. Ph.D. thesis, Université Libre de Bruxelles (ULB), Belgium. October 2008.

TD02. D. Catanzaro. *Metaheuristic approaches for inferring phylogenies*. Diplome d'Etudes Approfondies en Sciences Appliquées (D.E.A.), Université Libre de Bruxelles (ULB), Belgium. September 2004.

TD03. D. Catanzaro. *An automated course scheduling system based on tabu search*. Tesi di Laurea in Ingegneria Informatica, Università degli studi di Palermo, Palermo, Italia. April 2003.

Technical
Reports

TR01. D. Catanzaro, R. M. V. Figueiredo, and M. Labbé. *The maximum k-balanced subgraph of a signed graph*. Discrete Applied Mathematics.

Contribution: I contributed to conceive the work and to write the article, implemented the models/algorithms, and performed computations.

TR02. D. Catanzaro, R. Pesenti, and M. C. Milinkovitch. *Estimating phylogenies under maximum likelihood: A very large-scale neighborhood approach*. Technical Report 583, G.O.M., Université Libre de Bruxelles (ULB), Belgium, February 2008.

TR03. D. Catanzaro. *Metaheuristic approaches for inferring phylogenies*. Technical Report TR-2004-2, IRIDIA, Université Libre de Bruxelles (ULB), Belgium, September 2004.

Conference
Proceedings

CP01. D. Catanzaro, M. Labbé, and B. V. Halldórsson. *A mixed integer programming model for the parsimonious loss of heterozygosity problem*. Proceedings of ISBRA 2012 (LNBI 7292).

CP02. D. Catanzaro, M. Andrien, M. Labbé, and M. Toungouz-Nevevsky. *Mathematical models for HLA association studies: A case study for psoriasis and severe alopecia areata*. Proceedings of EFI 2009, Tissue Antigens 73(5), 399-400, 2009.

Posters in
Conferences

PC01. Benelux Bioinformatics Conference, Center for Computational Systems Biology, Catholic University Leuven, Leuven, Belgium, on November 12-13 2007.

PC02. Mathematics for Evolution and Phylogeny (MEP 05), Institut Henry Poincaré, Paris, France, on June 17-21 2005.

Conferences, Seminars, and Invited Talks

Talks in Int.
Conferences

TC01. Cargese Workshop on Combinatorial Optimization, Cargese, France, from September 19-23, 2022.

TC02. 32th European Conference on Operations Research (EURO 2022), Espoo, Finland, July 3-6, 2022.

TC03. Mathematical and Computational Evolutionary Biology (MCEB 2022), Chateau d'Oex, Switzerland, June 26-30, 2022.

TC04. International Symposium on Combinatorial Optimization (ISCO 2022), Paris, May 18-20, 2022.

- TC05. International Symposium on Combinatorial Optimization (ISCO 2020), co-located with Optimization Days 2020, Montreal, Canada, May 4-6, 2020. Cancelled due to CoVID19.
- TC06. Workshop on Integer and Combinatorial Optimization, RWTH Aachen, Aachen, March 11-12, 2020. Cancelled due to CoVID19.
- TC07. 30th European Conference on Operational Research (EURO) 2019, Dublin, Ireland, on June 23-26, 2019.
- TC08. 23st International Symposium on Mathematical Programming (ISMP 2018), Bordeaux, France, on July 1-6 2018. Session Chair.
- TC09. International Conference 2018 on Applied Combinatorial Optimization (EURO/ALIO 2018), Bologna, Italy, on June 25-27 2018.
- TC010. CORE@50 Conference, Center for Operations Research and Econometrics, Louvain-la-Neuve, Belgium, on May 23-27, 2016.
- TC011. 30th Annual Conference of the Belgian Operations Research Society, Louvain la Neuve, Belgium, on January 28-29, 2016.
- TC012. 22st International Symposium on Mathematical Programming (ISMP 2015), Pittsburgh, PA on July 12-17 2015. Session Chair.
- TC013. 26th European Conference on Operational Research (EURO) 2013, Rome, Italy, on July 1-4, 2013.
- TC14. Journées Graphes et Algorithmes 2012 (JGA), Clermont-Ferrand, France, on November 14-16, 2012. Invited Talk.
- TC15. 2th Bio-Optimization Workshop: Optimization techniques applied to biology, Lisbon, Portugal, on September 22, 2012. Plenary Talk.
- TC16. Computational Biology, Bioinformatics and Medicine (EURO-CBBM), University of Nottingham, Nottingham, United Kingdom, on September 13-15, 2012.
- TC17. 21st International Symposium on Mathematical Programming (ISMP 2012), Berlin, Germany, on August 19-24 2012.
- TC18. International Symposium on Bioinformatics Research and Applications (ISBRA 2012), Dallas, Texas, on May 21-23, 2012.
- TC19. 26th Annual Conference of the Belgian Operations Research Society, Brussels, on February 2-3, 2012.
- TC20. Bio-Optimization Workshop: Optimization techniques applied to biology, Coimbra, Portugal, on June 25 2011. Plenary Talk.
- TC21. 24th European Conference on Operations Research (EURO XXIV), Lisbon, Portugal, on July 11-14 2010.
- TC22. International Workshop on Combinatorial Optimization (Aussois 2010), Aussois, France, on January 3-9 2010.
- TC23. 20th International Symposium on Mathematical Programming (ISMP 2009), Chicago, Illinois, on August 23-28 2009.
- TC24. 23th European Immunogenetics and Histocompatibility Conference (EFI) 2009, Ulm, Germany, on May 09-12 2009.
- TC25. Computational Biology, Bioinformatics and Medicine (EURO-CBBM), Consiglio Nazionale delle Ricerche (CNR), Rome, Italy, on September 15-17 2008.
- TC26. 7th Cologne-Twente Workshop on Graphs and Combinatorial Optimization, Università degli Studi di Milano, Gargnano, Italy, on May 13-15 2008.
- TC27. International Symposium on Combinatorial Optimization 2008, University of Warwick, Warwick, United Kingdom, on March 16-19 2008. Session Chair.
- TC28. Future Directions in Phylogenetic Methods and Models, Isaac Newton Institute for Mathematical Sciences, Cambridge, United Kingdom, on December 17-21 2007.
- TC29. 9th Evolutionary Biology Meeting, Marseille, France, on September 21-23 2005.

Seminars
& Invited
Talks

- IT01. Computer Science Department, Université Libre de Bruxelles, February 8, 2022.
- IT02. 1ère journée ROADEF et ORBEL, joined annual meeting of ROADEF and ORBEL, February 1, 2020. Workshop held online due to COVID19 restrictions.
- IT03. Istituto di Analisi dei Sistemi ed Informatica “Antonio Ruberti” (IASI-CNR), Roma, Italy, February 26, 2020.
- IT04. IB2, Université Libre de Bruxelles - Vrij Universiteit Brussel, Brussels, Belgium, April 22, 2016.
- IT05. Department of Computer Science, University of Palermo, Palermo, Italy, February 12, 2015.
- IT06. Ludwig Institute for Cancer Research, De Duve Institute, Université Catholique de Louvain, Brussels, Belgium, February 5, 2015.
- IT07. Center for Operations Research and Econometrics (CORE), Université Catholique de Louvain, Louvain-la-Neuve, Belgium, October 28, 2014.
- IT08. Department of Applied Mathematics, SINTEF, Oslo, Norway, on November 8, 2013.
- IT09. CODeS - KAHO Sint-Lieven, Catholic University Leuven, Gent, Belgium, on August 23, 2013.
- IT010. Operations Research Unit, Polytechnic of Mons, Belgium, on June 8, 2013.
- IT11. Computer Science Department, Polytechnic of Lille, France, on May 13, 2013.
- IT12. Computer Science Department, University of South Denmark, Odense, Denmark, on February 12, 2013.
- IT13. Unit of Bioinformatics and Sequence Analysis, INRIA Lille - Nord Europe, France, on December 4, 2012.
- IT14. CODeS - KAHO Sint-Lieven - KU Leuven, Gent, Belgium, on December 3, 2012.
- IT15. Department of Computer Science, King’s College London, UK, on November 6, 2012.
- IT16. Laboratoire d’Informatique, de Robotique et de Microélectronique de Montpellier (LIRMM)-CNRS, Montpellier, France, on October 3, 2012.
- IT17. Center of Genomic Science, Italian Institute of Technology, Milan, Italy, on September 19, 2012.
- IT18. Faculty of Economics and Business, University of Groningen, Groningen, The Netherlands, on September 17, 2012.
- IT19. Department of Biological Sciences, Carnegie Mellon University, Pittsburgh, PA, USA, on June 5, 2012.
- IT20. Bioinformatics Research Center and Department of Economics and Business, Aarhus Universitet, Aarhus, Denmark, on October 20-21, 2011.
- IT21. School of Mathematics, University of Southampton, Southampton, UK, on May 30th - June 1, 2011.
- IT22. Department of Industrial Engineering and Operations Research, Columbia University, New York, NY, on April 26, 2011.
- IT23. Tepper School of Business, Carnegie Mellon University, Pittsburgh, PA, USA, on April 8, 2011.
- IT24. Department of Computer Science, Reykjavik University, Reykjavik, Iceland, on June 10, 2010.
- IT25. Department of Mathematics and Computer Science, Freie Universität Berlin, Germany, on June 2, 2010.
- IT26. Computational Evolutionary Genomics Group, University Medical Center (C.M.U.), Department of Medicine, Swiss Institute for Bioinformatics (S.I.B.), Geneva, Switzerland, on June 22, 2009.
- IT27. Computer Science Department, Università degli studi di Torino, Turin, Italy, on June 16, 2009.

- IT28. Bioinformatics Research Group, Department of Electrical Engineering (ESAT/SCD), Catholic University Leuven, Belgium, on November 5, 2008.
- IT29. OptLab, Department of Information Technologies, University of Milan, Crema, Italy, on May 17, 2008.
- IT30. Centro de Investigação Operacional, Faculdade de Ciências, Universidade de Lisboa, Lisbon, Portugal, on February 10-12, 2008.
- IT31. Institut de Recherches Interdisciplinaires et de Développements en Intelligence Artificielle (IRIDIA), Université Libre de Bruxelles (ULB), Belgium, on March 20, 2007.
- IT32. 13th Mathematical Programming Meeting - 3rd FNRS cycle, Han-sur-Lesse, Belgium, on March 22-23, 2007.
- IT33. CINBIOS (Centre de BioInformatique et BioModelisation) meeting, Department of Computer Science, Université Libre de Bruxelles, Belgium, on September 29, 2006.
- IT34. Computer Engineering and Networks Laboratory (TIK), E.T.H. Zurich, Switzerland, on October 7, 2004.
- IT35. Metaheuristics Network Final Meeting, Edinburgh, UK, on June 27-29, 2004.

Scientific Collaborations (Partial list)

- Academic Collaborations
- Raffaele Pesenti**, Department of Applied Mathematics, University 'Ca Foscari of Venice, Italy. R. Pesenti was my master thesis supervisor and is one of my most active collaborators. Our joined efforts gave rise to the articles A05; A07; A010; A20; A21; A22; R02;
- R. Schwartz**, Department of Biological Sciences and Department of Computational Biology of Carnegie Mellon University, USA. Our joined efforts gave rise to A06 and S04.
- R. Ravi**, Tepper School of Business of Carnegie Mellon University, USA. Our joined efforts gave rise to A06.
- Bjarni V. Halldórsson**, Department of Computer Science and Biomedical Engineering of Reykjavik University, Iceland. Our joined efforts gave rise to A012, A14 and A26.
- Magnur Mar Halldórsson**, School of Science and Engineering, Reykjavik University, Iceland. Our joined efforts gave rise to A26.
- Luis Eduardo Neves Gouveia**, Department of Statistics and Operations Research, University of Lisbon, Portugal. Our joined efforts gave rise to the article A24;
- Laurence Wolsey**, Center for Operations Research and Econometrics (CORE), Catholic University of Louvain, Belgium. Collaboration in progress;
- Dr. Marco di Summa**, Department of Applied Mathematics, University of Padua, Italy. Our joined efforts gave rise to the articles A08 and A05.
- J. J. Salazar-González**, Department of Statistics and Operations Research of the University of La Laguna, Spain. Our joined efforts gave rise to A07 and A010.
- Alejandro A. Schäffer**, Computational Biology Branch of NCBI, NIH, Bethesda, MD, USA. Our joined efforts gave rise to the articles S04;
- Roberto Aringhieri**, Department of Computer Science, University of Turin, Italy. Our joined efforts gave rise to the articles A05 and A08.

Editorial and Organizational Activities

As of May 2021, I am part of the Advisory Board of the International Journal “Mathematical Methods in Economics and Finance” and as of July 2021 I am acting as an Associate Editor of Soft Computing. I was among the organizers of the 26th Annual Conference of the Belgian Operations Research Society (ORBEL 2012) as well as of the Journées Franciliennes de Recherche Opérationnelle 2021 (joined annual meeting of both the French Operational Research Society Société (ROADEF) et la Belgian Operational Research Society (ORBEL). Moreover, I frequently serve as a referee for numerous international journals and conferences, including (the list may be not updated):

OR Journals	Discrete Applied Mathematics, INFORMS Journal on Computing, Networks, Mathematical Reviews, Journal of Discrete Optimization, Computers and Operations Research, European Journal of Operational Research, 4OR, Journal of Genetic Programming and Evolvable Machines, International Transactions in Operational Research, Information Processing Letters.
Bioinformatics Journals	Bioinformatics, PLoS One, IEEE/ACM Transactions on Computational Biology and Bioinformatics, Journal of Computational Biology, Genetics and Molecular Biology, Evolutionary Bioinformatics, Tissue Antigens.
International Conferences	4th International Workshop on Hybrid Metaheuristics (HM07) 2007, International Network Optimization Conference (INOC) 2009, 25th European Workshop on Computational Geometry (ECG09) 2009, European Conference on Computational Biology 2010, Learning and Intelligent Optimization Conference (LION6) 2012, International Conference on Research in Computational Molecular Biology (RECOMB 2012), Workshop on Algorithms for Bioinformatics (WABI 2012), The International Symposium on Bioinformatics Research and Applications (ISBRA 2012), 3rd International Symposium on Combinatorial Optimization (ISCO 2014).
Institutions	The Belgian national fund for scientific research, the Romanian national research council, the European Union (Horizon 2020 Programme, DIGI-B-CUBE), and the Fondation Cariplo and CDP in the context of the “Supporto ai giovani talenti italiani nelle competizioni dell’European Research Council”.

Teaching Experience

I am (or I have been) in charge for the following bachelor and master courses:

Date	Label Synopsis
2019-Now	UCL-TC01 Production Management and Modeling . Louvain School of Management (LSM), UCL , Belgium. ETCS: 5. Theory: 30h; Level: Master. Language: English. Description: Facility Location including aspects related to capacity, service level, multi-echelon, multi-product. Advanced models for demand estimation. Scheduling, cutting stock, bin packing, planning and routing problems.
2017-Now	UCL-TC03 Optimization . Louvain School of Management (LSM), UCL , Belgium. ETCS: 5. Theory: 30h; Exercises: 15h. Level: Bachelor. Language: English. Description: Part I (Continuous Optimization): Continuity, differentiability in n dimension, conditions for differentiability, necessary conditions for optimality, convex sets, convex functions, convex optimization problems, Lagrangian duality, gradient descent algorithms, rudiments of smooth and non-smooth nonlinear optimization; Part II (Discrete Optimization): Formulations; optimality, relaxation, and bounds; relationships between relaxations; efficient optimization property; total unimodularity and efficient convex hull property; strong duality property; efficient separation property; matchings and assignments; introduction to branch-and-bound.
2014-Now	UCL-TC04 Quantitative Decision Making . Louvain School of Management (LSM), UCL , Belgium. ETCS: 5. Theory: 30h; Exercises: 0h. Level: Master. Language: English. Description: integer linear systems: projection and inverse projection; projection: Benders decomposition; inverse projection: Dantzig-Wolfe decomposition; recall

of Lagrangian duality; cutting plane algorithms; strong valid inequalities; branch-and-cut; capital budgeting; portfolio optimization; Internet combinatorial auctions; introduction to integer optimization methods for machine learning.

- UCL-TC05 **Supply Chain Management**. Louvain School of Management (LSM), **UCL**, Belgium. ETCS: 5. Theory: 30h; Exercises: 0h. Level: Master. Language: English/French. Description: Part I (Foundation of strategic supply chain network design): value of supply chain network modeling, intuition building with center of gravity models, locating facilities using a distance-based approach, alternative service levels and sensitivity analysis, adding capacity to the model, adding costs to two echelon supply chains, adding outbound transportation to the model, introducing facility fixed and variable costs, baseline and optimal baselines; Part II (advanced modeling including the extension to multiple echelons): three echelon supply chain modeling, adding multiple products and multi-site production sourcing, multi-objective optimization, how to get industrial strength results, data aggregation in network design, case studies.
- UCL-TC06 **Coding Project (Projet de Programmation)**. Louvain School of Management (LSM), **UCL**, Belgium. ETCS: 5. Theory: 30h; Exercises: 15h. Level: Master. Language: English/French. Description: Fundamental data structures, introduction to graph theory, recursion, exploring and searching on graphs, dynamic programming part I (well solved optimization problems in management science: spanning trees), dynamic programming part II (well solved optimization problems in management science: shortest paths), dynamic programming part III (well solved optimization problems in management science: network flows), dynamic programming part IV (well solved optimization problems in management science: matching), hard optimization problems in management science part I (finding the optimum via enumeration), hard optimization problems in management science part II (heuristics, local searches and metaheuristics).
- 2018-2019 UCL-TC01 **Integer Programming and Combinatorial Optimization (former L. Wolsey's Course)**. Ecole Polytechnique de Louvain (EPL), **UCL**, Belgium. ETCS: 5. Theory: 30h; Exercises: 22.5h. Level: Master. Language: English. Description: Formulations; optimality, relaxations and bounds; relationships between relaxations; efficient optimization property; total unimodularity and efficient convex hull property; strong duality property; efficient separation property; matchings and assignments; branch-and-bound; strong inequalities and branch-and-cut; branch-and-price; introduction to optimization over lattices.
- UCL-TC02 **Tools for Supply Chain Management Decisions**. Louvain School of Management (LSM), **UCL**, Belgium. ETCS: 5. Theory: 30h; Level: Master. Language: English. Description: Convexity; Minkowski polyhedral representation; duality; from linear programming to convex programming; the revised simplex algorithm as a computational paradigm; complexity of algorithms; mixed integer programming; models and methods for cutting stock, bin packing, planning and scheduling problems.
- 2014-2017 UCL-TC07 **Quantitative Project and Project Management**. Louvain School of Management (LSM), **UCL**, Belgium. ETCS: 5. Theory: 15h; Exercises: 0h. Level: Master. Language: French. Description: The course focus on the resolution, via optimization techniques, of industrial problems involving, among others, transportation, location, planning, routing, and network design features. The introductory part of the course consists of a recall of mixed integer linear programming, including modeling with binary variables, logical conditions, simple implications, generalized implications, products of binary variables, dichotomies, counting, general integer, partial integers, semi-continuous variables, products of binary variables and real variables, fundamental theory of the real case studied, prototyping with Fico Xpress IVE, basics of Fico Xpress Mosel, advanced aspects of Fico Xpress Mosel.
- 2014-2015 ULB-TC01 **Algorithms 2 (INFO-F-203)**. Computer Science Department, **Université Libre de Bruxelles**, Belgium. ETCS: 5. Theory: 24h; Exercises: 24h. Level: Bachelor.

Language: French. Description: The course provides an introduction to hash tables, binary search trees, red-black trees, graphs, search for strongly connected components and cycles, topological sorting, minimum spanning trees, shortest path algorithms, general algorithms on graphs.

- 2013-2014 RUG-TC01 **Operations Research 2 (Foundation of Logistics System Engineering)**. Faculty of Economics and Business, **University of Groningen**, The Netherlands. ETCS: 5. Theory: 40h; Exercises: 40h. Level: Bachelor. Language: English. Description: The course deals with optimization aspects related to transportation, location, planning, routing, network optimization, and (introduction to) heuristics and integer programming.
- RUG-TC02 **Integer Programming & Combinatorial Optimization**. Faculty of Economics and Business, **University of Groningen**, The Netherlands. ETCS: 5. Theory: 40h; Exercises: 40h. Level: Master. Language: English. Description: The course covers all of the topics discussed in the book L. Wolsey. *Integer Programming*, Wiley Interscience, NY, 1998.
- RUG-TC03 **Capita Selecta EORAS (Advanced Linear and Integer Optimization)**. Faculty of Economics and Business, **University of Groningen**, The Netherlands. ETCS: 5. Theory: 40h; Exercises: 40h. Level: Master. Language: English. Description: The course deals with projective and decomposition approaches to large scale linear and integer programming, with special attention to Bender's decomposition and Dantzig-Wolfe decomposition.
- 2012-2013 RUG-TC04 **Supply Network Analysis**. Faculty of Economics and Business, **University of Groningen**, The Netherlands. ETCS: 5. Theory: 40h; Exercises: 40h. Level: Master. Language: English. Description: The course covers advanced aspects of combinatorial optimization and covers the following topics: Network Matrices, Total Unimodularity, Network Design; Polyhedral Combinatorics, Strengthening Valid Inequalities, Branch-and-Price.
- 2011-2012 ULB-TC02 **Algorithms 2 (INFO-F-203)**. Computer Science Department, **Université Libre de Bruxelles**, Belgium. ETCS: 5. Theory: 24h; Exercises: 24h. Level: Bachelor. Language: French. Description: The course provides an introduction to hash tables, binary search trees, red-black trees, graphs, search for strongly connected components and cycles, topological sorting, minimum spanning trees, shortest path algorithms, general algorithms on graphs.
- Teaching activities (exercise sessions) during the post-doctoral activities:
- 2011-2013 ULB-EX01 **Combinatorial Optimization (INFO-F-424)**. Computer Science Department, **Université Libre de Bruxelles**, Belgium. ETCS: 5. Theory: 24h; Exercises: 12h. Level: Master. Language: French. Description: The course covers all of the topics discussed in the book L. Wolsey. *Integer Programming*, Wiley Interscience, NY, 1998.
- 2011-2012 ULB-EX02 **Continuous Optimization (INFO-F-524)**. Place: Computer Science Department, **Université Libre de Bruxelles**, Belgium. ETCS: 5. Theory: 24h; Exercises: 12h. Level: Bachelor. Language: French. Description: The course covers linear programming, constrained and unconstrained optimization, Lagrangian relaxation in combinatorial optimization; column generation methods, the interior point method.
- 2009-2011 ULB-EX03 **Foundations of Computer Science (INFO-F-206)**. Computer Science Department, **Université Libre de Bruxelles**, Belgium. ETCS: 10. Theory: 36h; Exercises: 48h; Final Project: 12h. Level: Bachelor. Language: French. Description: The course introduces to computer science and deals with the fundamental algorithms on arrays and lists, recursion, and sorting.

Supervision Activities at Postgraduate Level

Type	Name	Synopsis
Postdoctoral Researchers	Allan Sapucaia	<p>Doctor in Combinatorial Optimization from the University of Campinas (2017-2022) under the supervision of both Pedro J. de Rezende and Cid C. de Souza. His doctoral studies focused on computational geometry and integer linear programming, with special attention to the development of decomposition techniques for partitioning, packing and covering problems. Allan got both the von Neumann Award (Highest GPA among C.E graduates - Institute of Computing, UNICAMP 2017) and the Babbage Award (Highest GPA among C.E students - Institute of Computing, UNICAMP 2015). He is currently focusing on optimization problems defined over specific classes of acyclic connected graphs.</p>
Doctoral Students	Martin Frohn	<p>Graduate student from University of Köln, Germany, under the supervision of Michael Junger. Martin started his doctoral studies in 2017 under my supervision. His doctoral studies focus on the characterization of a particular class of network design problems having important practical applications in phylogenetics and evolution, information theory, and data compression and encryption. His PhD defense will hold during the academic year 2021. So far, Martin authored the following manuscripts:</p> <ul style="list-style-type: none"> – D. Catanzaro, M. Frohn, O. Gascuel, and R. Pesenti. A Tutorial on the Balanced Minimum Evolution. <i>European Journal of Operational Research</i>, invited article, minor revision pending, 2021. – M. Frohn. On the approximability of the Fixed-Tree Balanced Minimum Evolution Problem. <i>Optimization Letters</i>, accepted, 2021. – D. Catanzaro, M. Frohn, and R. Pesenti. An information theory perspective on the Balanced Minimum Evolution Problem. <i>Operations Research Letters</i>, 48(3): 362-367, 2020. – D. Catanzaro, M. Frohn, and R. Pesenti. A massively parallel exact solution algorithm for the Balanced Minimum Evolution Problem. Journal article in preparation; currently Technical report TR-06-2021, Center for Operations Research and Econometrics, Université Catholique de Louvain, Belgium. – D. Catanzaro, M. Frohn, R. Pesenti. Greed, majorization, and their impact on optimization over lattices of unrooted binary trees. Technical Report TR-05-2019, Center for Operations Research and Econometrics, Université Catholique de Louvain, Belgium.
	Henri Dehaybe	<p>Graduate student from UCL, Belgium, under my supervision. Henri started his doctoral studies in 2018-2019 under the supervision of my colleague, Philippe Chevalier, and mine. His work focuses on optimization and reinforcement learning approaches for stochastic multilevel inventory management. The expected PhD defense is scheduled on 2024. So far, Henri authored the following manuscripts:</p> <ul style="list-style-type: none"> – H. Dehaybe, D. Catanzaro, and P. Chevalier. A Deep Reinforcement Learning approach for the Stochastic Inventory Problem. <i>Operations Research</i>, 2021.
	Roberto Ronco	<p>Roberto is carrying out his doctoral studies in Computer Science and Operations Research at the University of Genoa, Italy, under the supervision of Massimo Paolucci. Large part of his research efforts are currently focusing on scheduling problems. I have collaborated with Roberto in the context of the following article:</p> <ul style="list-style-type: none"> – D. Catanzaro, R. Pesenti, R. Ronco. A new fast and accurate solution approach for the automatic scene detection problem. <i>Computers and Operations Research</i>, April 2021.

Céline Engelbeen Céline carried out her doctoral studies at Department of Mathematics of the Université Libre de Bruxelles, under the supervision of my colleague Samuel Fiorini. She worked on constrained decompositions of integer matrices in the context of intensity modulated radiation therapy. We collaborated during her postdoctoral studies on the following article:

- D. Catanzaro and C. Engelbeen. An integer linear programming formulation for the minimum cardinality segmentation problem. *Algorithms*, 8(4), 999-1020, 2015.

Luciano Porretta Graduate student from University of L'Aquila under my co-supervision (2010). Luciano carried out his doctoral studies at the Graphs and Mathematical Optimization Unit of the Computer Science Department of the Université Libre de Bruxelles, Belgium, under the supervision of my colleague Bernard Fortz. He was awarded the title of Doctor of Sciences in January 2018. I have intensely collaborated with Luciano on a large part of his doctoral studies, focused on models and methods in genome-wide association studies. Our collaboration gave rise to the following articles:

- L. Porretta, D. Catanzaro, B. V. Halldórsson, and B. Fortz. A Branch&Price Algorithm for the Minimum Cost Clique Cover Problem in Max-Point Tolerance Graphs. *4OR*, 17(1), 75-96, 2019.
- D. Catanzaro, M. Labbé, and L. Porretta. A class representative model for pure parsimony haplotyping under uncertain data. *PLoS One* 6(3): e17937, 2011.

I have been member of the following doctoral defense committees:

Belgium

- BE01 Xavier Gillard. Title: *Discrete Optimization with Decision Diagrams*. Institute of Information and Communication Technologies, Electronics and Applied Mathematics, Louvain School of Engineering, Université Catholique de Louvain, August 2022. Member of the Committee.
- BE02 Nikita Doikov. Title: *Development of Second-Order Methods for Convex Optimization Problems*. Institute of Information and Communication Technologies, Electronics and Applied Mathematics, Louvain School of Engineering, Université Catholique de Louvain, September 2021. Member of the Committee.
- BE03 José Miguel Pesada Perez. Title: *Express shipment service network design: Challenges, advances and robustness*. Louvain School of Management, Université Catholique de Louvain. Private Defense: March 17 2020. Public Defense: June 17, 2020. Chairman.
- BE04 Luciano Porretta. Title: *Models and methods for genome-wide association studies*. Graphs and Mathematical Optimization Unit, Computer Science Department, Université Libre de Bruxelles, January 2018. Member of the Committee.
- BE05 Cyrille Dejemeppe. Title: *Abstractions and algorithms for scheduling applications*. Institute of Information and Communication Technologies, Electronics and Applied Mathematics, Louvain School of Engineering, Université Catholique de Louvain, June 2016. Member of the Committee.

Italy

- IT01 Veronica Dal Sasso. Title: *Branch-and-price approaches for pure-parsimony haplotyping*. Department of Mathematics, University of Padua, Italy, December 2016. Member of the Committee.

Other supervision activities

Type	Description
Master Students	<p>I have supervised the master theses of over 40 students from the Université Libre de Bruxelles (Belgium), the Université de Mons-Hainaut (Belgium), the Università degli studi dell'Aquila (Italy), the University of Padua (Italy), the University of Groningen (The Netherlands), the University of Palermo (Italy), the Polytechnic University of Catalunya (Spain), and the Université Catholique de Louvain (Belgium).</p> <p>One of them worth a particular mention, namely Lieke Kools. Her master thesis entitled “Minimizing energy waste in real energy network distribution” carried out at the Faculty of Economics and Business of the University of Groningen, The Netherlands, was selected as the best master thesis in economics and business for the academic year 2014.</p>

Spoken Languages

Mother Tongue	Italian;
Fluent	English, French, Spanish;
Beginner	Dutch (Level A1.1 obtained at the Vrije Universiteit Brussel on 06/2010).

Last update: [September, 2022](#).