Federico Malucelli

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A. PERSONAL DATA

Family name	Malucelli
Name	Federico
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A.1. EDUCATION

1993	Ph.D. in Computer Science - University of Pisa
1988	Laurea in Computer Science - University of Pisa

A.2. WORKING CAREER

2002–Today	Full Professor of Operations Research - Politecnico di Milano
1998–2002	Associate Professor of Operations Research - Politecnico di Milano
1994–1998	Research Associate of Operations Research - University of Perugia
1992–1994	Research Associate of Operations Research - University of Pisa

A.3. MAIN RESEARCH TOPICS

The research activities has been developing in the area of combinatorial optimization caring in particular the methodological and algorithmic aspects as well as the application and modeling aspects. The main investigated application fields are those related with transportation, telecommunications but also with health management and energy.

OPTIMIZATION IN TRANSPORTATION

New flexible transportation models have been proposed and mathematical programming and optimization algorithm have been proposed to efficiently manage and design the service (in collaboration with T. G. Crainic, M. Nonato, F. Errico).

Vehicle and crew scheduling problems arising in managing local transportation companies have been studied as well as disruption management in local public transport (in collaboration with MAIOR srl and S. Gualandi).

Disruption management and real time crew and vehicle rescheduling in local public transport, both surface and subway transit systems (in collaboration with E. Tresodi, MAIOR srl and ATM)

Special waste collection and disposal problems have been studied (in collaboration with R. Aringhieri, M. Bruglieri and M. Nonato).

Equilibrium and passenger assignment models have been proposed in the context of public transportation with capacity (in collaboration with S. Nguyen and S. Pallottino). These models have been applied also in the timetable design in order to improve the service quality in the case of urban and suburban public transportation.

Hub location and dimensioning problems have been studied in the case of an international road transportation company (in collaboration with R. Wolfler-Calvo). The problem of routing and vehicle scheduling for a Less than Truckload transportation has been studied (in collaboration with R. De

Leone, M. Nonato and D. Pretolani).

QUADRATIC AND NON LINEAR 0-1 PROBLEMS

The Quadratic Assignment problem has been the subject of the Ph.D. thesis. In particular many combinatorial lower bounding procedures have been proposed (in collaboration with P. Carraresi). Also the Quadratic Semi Assignment has been studied identifying some particular cases solvable in polynomial time (in collaboration with D. Pretolani). Moreover for the more general unconstrained 0-1 quadratic problems some approximation schemes for testing necessary and sufficient optimality conditions have been proposed (in collaboration with P. Carraresi, F. Farinaccio, M. Pappalardo). Quadratic and more general non linear set covering problems have been studied providing decomposition exact methods (in collaboration with E. Amaldi, S. Bosio and D. Yuan). Other quadratic 0-1 problems have been studied (Quadratic TSP, Quadratic Spanning tree and Quadratic shortest paths) in collaboration with B. Rostami.

GRAPH COLORING AND OTHER GRAPH OPTIMIZATION PROBLEMS

An efficient algorithm for determining a maximum non crossing matching on a bipartite graph with given layout has been proposed (in collaboration with D. Pretolani). Moreover the problem of coloring a bipartite graph with non crossing matching has been studied (in collaboration with S. Nicoloso). These problems are related with VLSI design, transportation problems and graph drawing. Also classical graph coloring problems have been tackled with hybrid methods involving mathematical programming, namely column generation methods, and constraint programming methods, yielding the best results to date (in collaboration with S. Gualandi).
The problem of partitioning grid graphs has been analyzed and several heuristic algorithms have been compared (in collaboration with S. Nicoloso and B. Simeone).
The class of Shiftable Interval Graphs has been defined as an extension of the class of Interval Graphs. For this class complexity issues have been studied and some algorithms have been designed (in collaboration with S. Nicoloso).

OPTIMIZATION IN TELECOMMUNICATIONS

This application field has inspired many interesting researches with important results also from the methodological point of view. In the area of network design and routing several contributions have been possible considering different technologies: multilayer networks, optical networks, broadband access networks, shared risk group protection, statistical multiplexing, etc. Many of these problems have been studied with qualified industrial partners (in collaboration with B. Addis, P. Belotti, A. Capone, G. Carello, S. Gualandi) Another area is that of the optimal planning of wireless networks: wireless local area networks, UMTS cellular networks, wireless mesh multihop networks (in collaboration with E. Amaldi, S. Bosio, A. Capone, M Cesana, D. Yuan).

GRAPH AND MATRIX BANDWIDTH REDUCTION

This general problem has many implications in the applications. The bandwidth reduction of sparse matrices has been dealt both from the theoretical point of view giving a new algorithm for recognizing bandwidth 2 graphs in linear time (in collaboration with A. Caprara and D. Pretolani), and from the application point of view providing a very fast and efficient heuristic. This heuristic resulted to be the most effective of the literature and has been applied with success in the field of electromagnetic

simulation.

B. INDIVIDUAL SCIENTIFIC ACTIVITIES

B.1. PUBLICATIONS

Google my citation profile: http://scholar.google.it/citations?user=8wHjtVAAAAAJ

B.2. AWARDS AND RECOGNITIONS

2014 Finalist at the best paper award of the Global Communications Conference (GLOBECOM), IEEE with F. Martignon and A. Capone
2016 Best application award, AIRO with E. Tresoldi and S. Carosi

B.3. RESEARCH PERIODS ABROAD

08/2006	09/2006	CRT Montreal	Visiting fellow
03/2004	04/2004	Norrkoping University	Visiting professor
03/2000	04/2000	Norrkoping University	Invited Researcher
11/1993	12/1993	CRT - Montreal	Visiting Fellow
06/1992	09/1992	HP Labs Palo Alto	Visiting Fellow

C. COMMON INTEREST SCIENTIFIC ACTIVITIES

C.1. RESEARCH PROJECTS IN CHARGE

Project name (Sponsor)	Project type L: Local N: National E: European O: Other	Period (yyyy/yyyy)	Project coordinator	Research Unit coordinator
PRIN 2008 (MIUR)	N	2010/2012		Research Unit coordinator
PRIN 2006 (MIUR)	N	2007/2009		Research Unit coordinator

C.2. MEMBERSHIP IN BOARDS/COMMITTEES/RESEARCH CENTERS ETC.

Type	Name	Role	Period (yyyy/yyyy)
Board	ICOOR interuniversity consortium	member	(2008-2014)
Board	ICOOR interuniversity consortium	CEO	(2015-today)
Scientific Committee	AIRO 2005 Conference	Chair of the Scientific Committee	(2005)
Scientific Committee	ALIO-EURO 2005 Conference	member	(2005)
Scientific Committee	ALIO-EURO 2002 Conference	member	(2002)

C.5. TECHNOLOGY TRANSFER

Type	Period (yyyy/yyyy)
MAIOR srl- ATM spa	2010–Today
Alcatel Italia	2000-2011
AEM	2004–2007

C.6. HIGH SCHOOL PROJECTS

In 2009-10 he has organized and held a course about modeling and optimization methods for high school teachers. The course has been held at ITC V. Monti of Ferrara. In 2008-9 and 2009-10 he has held some seminars of introduction to operations research at some high schools of Ferrara. In 2009 and 2010 he was tutor and he prepared some exercises for national high school competition organized by AIRO.

D. TEACHING ACTIVITIES

D.1. TEACHING IN CHARGE

Number of credits (CFU) per academic year, level, scientific sector (S.S.D.), and language - Last academic years

Academic Year (yyyy/yyyy)	Bachelor Italian	English	Master Italian	English	Ph.D. Italian	English	Specializing Master Italian	English	S.S.D.	Total
2016/2017	5		5						MAT/09	10
2015/2016	10		5						MAT/09	15
2014/2015	10		5						MAT/09	15
2013/2014	10		5		5				MAT/09	20
2012/2013	10		5						MAT/09	15
2011/2012	10		5		5				MAT/09	20
2010/2011	5		5						MAT/09	10
2010/2011			5						ING-INF/01	5
2009/2010			5						MAT/09	5
2009/2010			5						ING-INF/01	5
2008/2009			5						MAT/09	5
2008/2009			5						ING-INF/01	5
2007/2008	5		5		5				MAT/09	15
2007/2008			5						ING-INF/01	5

D.4. PH.D. SUPERVISION

Accademic year	Ph.D. Laureates
2014	Borzou Rostami
2008	Stefano Gualandi
2007	Fausto Errico
2003	Pietro Belotti

E. OTHER USEFUL INFORMATION

2012: Referee for technology transfer projects of Provincia Autonoma di Trento.
2013, 2016: Referee for technology transfer projects of Regione Valle d'Aosta.