Curriculum Vitae et Studiorum

Raffaele Cerulli

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Employment History

Associate Professor
December 2002 - present
University of Salerno, Fisciano (SA), Italy

Assistant Professor
July 1989 – December 2002
University of Salerno, Fisciano (SA), Italy

Education

Laurea Degree in Computer Science, University of Salerno, Salerno, Italy, March 1986.

Research Interests Summary

My research expertise is combinatorial optimizations with particular emphasis on location/allocation problems and network flow optimization. My main interest is the model and algorithm design for problems with application, telecommunication networks. In particular, my past and current research puts emphasis on the following topics: Labeled Spanning Tree and Bounded-Degree Spanning Tree Problems, Sensor location problems, Vehicle Routing Problem with LIFO Constraints, Wireless Sensor Networks, Feedback vertex set problem.
I have authored or co-authored 23 fully refereed articles in international journals and conference proceedings relative to network flow and location problems on networks.
I am Guest Editor of the special issue of Networks related to the contributions presented to the AIRO 2012 conference (Annual conference of the Italian Operations Research Society). I was director of 4 different INTERNATIONAL SCHOOL ON MATHEMATICS "GUIDO STAMPACCHIA" at Centre "Ettore Majorana" for Scientific Culture Erice, Italy.
Research Area: Combinatorial Optimizations, Network Location, Network Flow, Exact and Metaheuristic solution Algorithms.

Publications

International Journal Articles and Peer Reviewed Conference Articles

23. F.Carrabs, R.Cerulli, M. Gaudioso, M.Gentili, "Lower and Upper Bounds for the Spanning Tree with Minimum Branch Vertices" Computational Optimization and Applications (to appear)
22. J. Silberholz, A. Raiconi, R. Cerulli, M. Gentili, B. Golden, S. Chen " Comparison of Heuristics for the Colorful Traveling Salesman Problem" International Journal of Metaheuristics (to appear).
21. R Cerulli, R De Donato, A Raiconi, "Exact and Heuristic Methods to Maximize Network Lifetime in Wireless Sensor Networks with Adjustable Sensing Ranges", European Journal of Operational Researc, (2012); 220:58-66.
20. R. Cerulli, F. Carrabs, M.G. Speranza, "A Branch-and-Bound Algorithm for the Double TSP with Two Stacks", NETWORKS, p. 1-12, ISSN: 0028-3045, doi: 10.1002/net.21468
19. R.Cerulli, F. Carrabs, M. Gentili, G.Parlato, "A Tabu Search Heuristic Based on k-Diamonds for the Weighted Feedback Vertex Set Problem", Lecture Notes in Computer Science. Series: Network Optimization: International Network Optimization Conference (INOC 2011), Hamburg, Germany, June 2011" (Vol. 6701).
18. F.Carrabs, R.Cerulli, M.Gentili, "The Labeled Maximum Matching Problem", Computers and Operations Research, 36 , 6 (2009) 1859-1871.
17. R. Cerulli, M.Gentili, A.Iossa, "Bounded-degree spanning tree problems: models and new algorithms", Computational Optimization and Applications, 42, 3 (2009) 353-370

16. R. Cerulli, M. Gentili, A. Iossa, "Efficient Preflow-push Algorithms", Computers and Operations Research 35, 8 (2008), 2694-2708.
15. Carrabs, F., Cerulli, R., Cordeau, J.-F., “An additive branch-and-bound algorithm for the pickup and delivery traveling salesman problem with LIFO or FIFO loading” INFOR 45 (4) , pp. 223-238 (2007).
14. R. Cerulli, A. Fink, M. Gentili, S. Voß, “Extensions of the Minimum Labelling Spanning Tree Problem”, Journal of Telecommunications and Information Technology, 4 (2006) 39-45.
13. R. Cerulli, P. Dell’Olmo, M. Gentili, A. Raiconi, “Heuristic Approaches for the Minimum Labelling Hamiltonian Cycle Problem”, Electronics Notes in Discrete Mathematics, 25 (2006) 131-138.
12. R. Cerulli, A. Fink, M. Gentili, S. Voß, ‘’Metaheuristics comparison for the minimum labelling spanning tree problem’’. In: B.L. Golden, S. Raghavan and E.A. Wasil (eds.), The Next Wave on Computing, Optimization, and Decision Technologies, Springer, New York (2005), 93 - 106. [ISBN: 0-387-23528-0].
11. F. Carrabs, R. Cerulli, M. Gentili, G. Parlato, “A Linear Time Algorithm for the Weighted Feedback Vertex Set on Diamonds”, Information Processing Letters, 94 (2005), 29-35.
10. F. Carrabs, R. Cerulli, M. Gentili, G. Parlato, “The Weighted Feedback Vertex Set on Diamonds”, Electronic Notes in Discrete Mathematics, 17 (2004), 87-91.
9. R. Cerulli, P. Festa, G. Raiconi, “Shortest path auction algorithm without contractions using virtual source concept’’, Computational Optimization and Applications, 26, 2 (2003), 191-208.
8. R. Cerulli, P. Festa, G. Raiconi, “Graph collapsing in shortest path Auction algorithms’’, Computational Optimization and Applications, 18, (2001), 199-220.
7. R. Cerulli, P. Festa, G. Raiconi, "Complexity and experimental evaluation of primal-dual shortest path tree algorithms", in Approximation and Complexity in Numerical Optimization: Continuous and Discrete Problems, P.M. Pardalos, (ed), Kluwer Academic Publishers (2000).
6. R. Cerulli, P. Festa, G. Raiconi, "A new forward backward Auction algorithm", in High Performance Algorithms and Software in Nonlinear Optimization, R. De Leone et al., (eds.), Kluwer Academic Publishers (1999).
5. R. Cerulli, P. Festa, G. Raiconi, G. Visciano, “ The Auction technique for the sensor based navigation planning of an autonomous mobile robot’’, Journal of Intelligent and Robotic Systems, 21 (1998), 373-395.
4. R. Cerulli, M. Gaudioso, Y.A.D. Sergeyev, "A multiplier adjustment technique for the concentrator location problem", Optimization Methods and Software,10 (1998), 87-102.
3. R. Cerulli, R. De Leone, G. Piacente, "A modified Auction algorithm for the shortest path problem", Optimization Methods and Software, 4 (1994), 209-224.
2. R. Cerulli, M. Gaudioso, R. Mautone, “A Class of Manpower scheduling Problems’’, Methods and Models of Operations Research, 36 (1992), 93-105.
1. R. Cerulli, M. Gaudioso, "Mean-variance approach to the management of cyclic deliveries", Computers & Operations Research, 15, 6 (1988), 561-565.

Minimally Reviewed Conference Proceedings Articles

These full length publications in proceedings went through a less rigorous peer review, and are associated with an oral presentation.

P2. R.Cerulli, P. Dell’Olmo, M.Gentili, A.Raiconi, Heuristic Approaches for the Minimum Labelling
Hamiltonian Cycle Problem. Electronics Notes in Discrete Mathematics, 25, pp. 131-138 (2006).
P1. F.Carrabs, R.Cerulli, M.Gentili, G.Parlato, The Weighted Feedback Vertex Set on Diamonds. Electronic Notes in Discrete Mathematics, 17, pp. 87-91 (2004).

Refereed Journals Articles Currently Under Review

UR3. R.Cerulli, M.Gentili, F.Sbordone, Vehicle-ID Sensor Location for Route Flow Recognition: Models
and Algorithms. Under first revision for Transportation Research Part B.

UR2. F.Carrabs, R.Cerulli, M.Gaudioso, M.Gentili, Lower and Upper Bounds for the Spanning Tree
with Minimum Branch Vertices. Under second revision for Computational Optimization and Applications.

UR1. L.Bianco, C.Cerrone, R.Cerulli, M.Gentili, Exact and Heuristic Solution Approaches for the Sensor Location Problem. Submitted to Computers and Operations Research.

Conference Presentations

C1. F.Carrabs, R.Cerulli, M.Gentili, G.Parlato, Minimum Weighted Feedback Vertex Set on Diamonds. AIRO2004 - International Conference of the Italian Operational Research Society, Lecce, Italy, 2004.

C2. F.Carrabs, R.Cerulli, M.Gentili, G.Parlato, Minimum Weighted Feedback Vertex Set on Diamonds. CTW2004 - Cologne-Twente Workshop on Graphs and Combinatorial Optimization. Villa Vigoni, Como, Italy, 2004.

C3. F.Carrabs, R.Cerulli, M.Gentili, Random Neighborhood Selection for the Vehicle Routing Problem with Time Windows. TRISTAN2004 - Triennial Symposium on Transportation Analysis, Guadeloupe, French West Indies, 2004.

C4. R.Cerulli, M.Gentili, A.Fink, S.Voss, Variable Neighborhood Search for the Labeling Spanning Tree Problem. IFORS2005. Honolulu, Hawaii, 2005.

C5. F.Carrabs, R.Cerulli, M.Gentili, G.Parlato, Efficient Exploration of k-diamond Neighborhoods for the Weighted Feedback Vertex Set Problem. AIRO2005 - International Conference of the Italian Operational Research Society, Camerino, Italy, 2005.

C6. R.Cerulli, P.Dell'Olmo, M.Gentili, A.Raiconi, Heuristic Approaches for the Minimum Labelling Hamiltonian Cycle Problem. CTW2006 - Cologne -Twente Workshop on Graphs and Combinatorial Optimization, Lambrecht (Germany), 2006.

C7. F.Carrabs, R.Cerulli, M.Gentili, A Cluster-Lightening Route Reduction Strategy for the Vehicle Routing Problem with Time Windows. EURO2006 - European Conference on Operational Research, Reykjavik (Island), 2006.

C8. R.Cerulli, P.Dell'Olmo, M.Gentili, A.Raiconi, The Labelled Hamiltonian Problem: Heuristic and Exact Approaches. AIRO2006 - International Conference of the Italian Operational Research Society, Cesena, Italy, 2006.

C9. R.Cerulli, R.De Leone, M.Gentili, A Heuristic Approach for a particular Cutting Stock Problem. AIRO2006 - International Conference of the Italian Operation Research Society, Cesena, Italy, 2006.

C10. F.Carrabs, R.Cerulli, M.Gentili, The Minimum Colored Maximum Matching. AIRO2007 – International Conference of the Italian Operation Research Society, Genoa, Italy, 2007.

C11. R.Cerulli, M.Gaudioso, M.Gentili, A Lagrangean Approach to the Bounded-Degree Spanning Tree Problem. AIRO2007 - International Conference of the Italian Operational Research Society, Genoa, Italy, 2007.
C12. R.Cerulli, M.Gentili, A.Raiconi, An Exact Approach for the Minimum Labelling Hamiltonian Cycle Problem. AIRO2007 - International Conference of the Italian Operational Research Society, Genoa, Italy, 2007.

C13. L.Bianco, R.Cerulli, M.Gentili, New Resolution Approaches for the Sensor Location Problem. AIRO2007 - International Conference of the Italian Operational Research Society, Genoa, Italy, 2007.

C14. R.Cerulli, M.Gaudioso, M.Gentili, A Dual Ascent Approach to the Bounded-Degree Spanning Tree Problem. EURO2007 - European Conference on Operational Research, Prague, Czech Republic, 2007.

C15. L.Bianco, R.Cerulli, M.Gentili, New Resolution Approaches for the Sensor Location Problem. TRISTAN2007 - Triennial Symposium on Transportation Analysis, Phuket Island, Thailand, 2007.

C16. R.Cerulli, M.Gentili, F.Sbordone, Sensor Location for Route Flow Monitoring on a Transportation Network. AIRO2009 - International Conference of the Italian Operational Research Society, Siena, Italy, 2009.

C17. R.Cerulli, M.Gentili, F.Sbordone, Sensor Location for Route Flow Monitoring on a Transportation Network. INFORMS 2009, San Diego, California, 2009.

C18. F.Carrabs, R.Cerulli, M.Gaudioso, M.Gentili, A Lagrangean Approach to the Bounded-Degree Spanning Tree Problem. INFORMS 2009, San Diego, California, 2009.

C21. L.Bianco, R.Cerulli, C.Cerrone, M.Gentili, New Resolution Approaches for the Sensor Location Problem. EWGLA2009 - Euro Working Group on Location Analysis, Naples, Italy, 2009.

C22. R.Cerulli, F.Carrabs, M.Gentili, G.Parlato, A Tabu Search Heuristic Based on k-Diamonds for the Weighted Feedback Vertex Set Problem. INOC 2011 - Network Optimization: International Network Optimization Conference, Hamburg, Germany, 2011.

C23. R.Cerulli, M.Gentili, A.Raiconi,Maximizing Lifetime and Handling Reliability in Wireless Sensor
Networks Using Adjustable Sensing Ranges. AIRO2011 - International Conference of the Italian Operational Research Society, Brescia, Italy, 2011.

C24. A.Raiconi, J.Silberholz, R.Cerulli, M.Gentili, B.Golden, S.Chen, Comparison of Heuristics for the Colorful Traveling Salesman Problem. VEROLOG 2012 - EURO working Group on Vehicle Routing and Logistics Optimization, Bologna, Italy, 2012.

C25. R.Cerulli, M.Gentili, Vehicle-ID Sensor Location for Route Flow Recognition: Models and Algorithms.
AIRO2012 - International Conference of the Italian Operational Research Society, Vietri sul Mare (Salerno), Italy, 2012.

International Collaborations

Prof. Manlio Gaudioso, Dipartimento di Elettronica Informatica e Sistemistica, Università della Calabria.
Prof. Paolo Dell'Olmo, Dipartimento di Statistica probabilità e Statistiche Applicate, Università "La Sapienza" di Roma.
Prof. Bruce Golden, Università di Maryland**,** Maryland (USA).
Prof. Stefan Voβ, Università di Hamburg**,** Germania**.**
Prof. Jean-François Cordeau, HEC Montréal, Montréal Canada.
Prof. Gilbert Laporte, HEC Montréal, Montréal Canada.
Prof. Nello Cristianini, Department of Statistics, University of California (USA).
Prof. Lucio Bianco, Dipartimento di Ingegneria dell'Impresa. Università di Roma 'Tor Vergata'
Prof. Dimitri Bertsekas, MIT Cambridge (MA) (USA)
Prof. Renato De Leone, Dipartimento di Matematica ed Informatica, Università di Camerino
Prof. Andreas Fink, Helmut-Schmidt-University Hamburg, Germania.

Teaching Experience

During my experience at the University of Salerno, I have taught from two to four courses per year. I have taught courses both at the undergraduate and graduate levels in the Computer Science degree program and in the Mathematics degree program. The courses are related to basic Operations Research topics, basic Logistics topics and more advanced topics in Operations Research and Combinatorial Optimization.

The topics covered on the above mentioned courses are briefly described below.

Operations Research:

Linear Programming: polyhedra, directions and extreme directions, vertices and extreme points. KKT conditions, representation theorem. The simplex method. Two phases method and the Big-M method. Degeneration and cycles. Convergence of the simplex method. Duality: dual problem formulations, strong and weak duality theorems. Complementary slackness conditions. Sensitivity analysis. Optimization on networks: simplex algorithm on networks. Optimization problems with TU matrices. Shortest path problem. Maximum flow problem. Min-Cost flow problems. Minimum cost spanning tree problem.

Optimization:

Mathematical programming and optimality conditions. Duality theory. Main elements of the ellipsoid method. Solution algorithms for large size problems: Dantzig-Wolfe decomposition method. Column generation method. Primal-dual method. Combinatorial Optimization: network flow problems. Main classes of combinatorial problems. Valid inequalities. Relaxations. Benders decomposition. Exact solution methods: branch and bound, branch and cut, branch and price. Local search algorithms and metaheuristics.

Operations Research and Logistics:

Supply chain: basic definitions, terminology and concepts. Location problems: p-median problem, p-center problem, flow interception problems, single flow one level model, multi flow two level model. Long distance distribution problems: single commodity minimum cost flow problem, multi commodity minimum cost flow problem, fixed charge network design problem. Short distance distribution problems: the travelling salesman problem, the vehicle routing problem, the Chinese postman problem Laboratory: how to build a mathematical model: single/multiple objective functions, piece-wiselinear function. Constraints typology. Logical constraints. Alternative constraints. Modeling with AMPL and Excel.