The Hong Kong Polytechnic University
Department of Logistics and Maritime Studies
Research Seminar

Optimal Solution of Vehicle Routing Problems with Fractional Objective Function

by

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Venue: R602, Shirley Chan Building
The Hong Kong Polytechnic University

(Conducted in English)

Abstract:

In this work, we consider vehicle routing problems that can be modelled as a Set Partitioning (SP) problem with a linear fractional objective function. More precisely, we consider three objective functions: minimization of cost over time, minimization of cost over load (also known as logistic ratio) and maximization of profit over time.

We investigate both continuous and integer relaxations of the SP model. In particular, we propose an alternative transformation to the transformation proposed by Charnes and Cooper (1962) for linear fractional programming and a dual ascent heuristic used to compute both dual and primal bounds. The dual and primal bounds computed are embedded in an iterative exact procedure where at each iteration a reduced SP problem is solved by an extension of Dinkelbach's algorithm for fractional programming to integer programs.

We report extensive computational results showing that the proposed method solves to optimality instances involving up to 79 customers. The method can be easily adapted to deal with other routing constraints, simply by taking into account of such constraints in the route generation phase.

Bio:

Roberto Baldacci was born in Cesena (Italy) on January 7, 1970. He received the Msc degree in Computer Science with top honours from the University of Bologna, Italy, in 1994 and the Ph.D. degree in Operations Research from the University of London, Imperial College, in 1999.

From October 1999 to February 2001 he was Postdoctoral Research Associate at the Centre for Quantitative Finance, Imperial College, London. From March 2001 to October 2005 he was a full-time researcher at the DISMI - Department of Engineering Sciences and Methods, of the University of Modena. From November 2005 to September 2012 he was a full-time researcher at the at the Department of Electronics, Computer Science and Systems (DEIS) of the University of Bologna.

On October 1, 2012 he was nominated Associate Professor of Operations Research at the II Faculty of Engineering of the University of Bologna. His research interests are in the theory and the applications of mathematical programming and combinatorial optimization.

He has worked in the design of new exact and heuristic methods for solving combinatorial optimization problems as vehicle routing, optimal location on graphs, cutting stock problem and carpooling.

He has published a number of papers in Operations Research, Computers and Operations Research, European Journal of Operational Research, Computational Management Science, 4OR, Journal of Operational Research Society, Journal of Heuristics, Transportation Science, Networks, Mathematical Programming, Annals of Operations Research, Discrete Applied Mathematics and INFORMS Journal on Computing.

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All are welcome!