Weighted Dantzig-Wolfe decomposition for linear mixed-integer programming

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Available online 10 June 1998.

Abstract

Dantzig-Wolfe decomposition can be used to solve the Lagrangian dual of a linear mixed-integer programming problem (MIP) if the dual structure of the (MIP) is exploited via Lagrangian relaxation with respect to the complicating constraints. In the so-called weighted Dantzig-Wolfe decomposition algorithm, instead of the optimal solution of the Dantzig-Wolfe master problem a specially weighted average of the previously constructed Lagrangian multipliers and the optimal solution of the master problem is used as Lagrangian multiplier for the next Lagrangian subproblem to be solved. A convergence proof of the weighted Dantzig-Wolfe decomposition algorithm is given, and some properties of this procedure together with computational results for the capacitated facility location problem are discussed.

Author Keywords: Optimization; mixed-integer programming; Dantzig-Wolfe decomposition; facility location

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The author was partly supported by “Schweizerischer Nationalfonds zur Förderung der wissenschaftlichen Forschung (Grant 12-30140.90)".

International Transactions in Operational Research
Volume 4, Issue 2, March 1997, Pages 151-162