Inventory Routing Problem with rational objective function

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Résumé

In this work we propose a column generation approach for solving the Inventory Routing Problem (IRP). The IRP is concerned with the distribution of a good from a set of sources to a set of customers over a given time horizon by using a homogeneous fleet of vehicles. We impose capacity constraints on the vehicles and time windows on the customers visited. We consider two versions of the problem: the first one is to minimize the total routing costs; the second one is to minimize the so-called non linear logistic ratio, i.e. the ratio between the total routing costs and the total quantity delivered over the time horizon. While both objective functions are common in practical application, only the first one has been studied deeply in practice. To the best of our knowledge, no exact approaches have been proposed in the literature for solving the IRP with the latter objective function. In order to deal with the rational objective function we introduce a suitable variables substitution, obtaining a linear formulation that can be used for computing valid lower bound for the problem within a global optimality framework. A unified column generation approach is described for solving both versions of the problem and preliminary computational results are provided.

Mots-Clés: Inventory Routing Problem, Column Generation, Mixed Integer Non Linear Programming

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