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A Heuristic to Solve the Weekly Log-Truck Scheduling Problem

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Abstract

We present in this article the log-truck scheduling problem, which combine routing and scheduling of trucks with some specific constraints related to the canadian forestry context. This problem includes aspects such as pick-up and delivery, multiple products, inventory stock, multiple supply points and multiple demand points. We developped a decomposed approach to solve the weekly problem, in two phases. At the first phase we use a tabu search algorithm to solve an integer problem in order to determine the destinations of full truckloads from forest areas to woodmills. At the second phase, we make use of a standard local search algorithm to schedule the daily transportation of logs. This approach has been implemented using COMET 0.07 that use the concept of constraint-based local search. We tested our method on a set of industrial cases from forest companies in canada.

Key words: Forestry, transportation, routing, scheduling, local search , constraint-based local search

1 Introduction

Scheduling problems in the forest industry have received significant attention in the recent years, essentially for economic and environmental reasons. Actually, the schedule of trucks is carried out manually by a specialist planner of the company.

The problem consist of a supply of differents products at many foret areas and a demand at differents woodmills. The volumes of wood are expressed in unit of truckload at both supply and demand points. In our case, there is no time windows at both forest areas and woodmills, trucks and loaders must be synchronised as much as possible to avoid waiting time. Demand at woodmills is given on a daily basis, whereas routes and schedules of trucks are to be found on a weekly basis. A particular constraint is present in our problem; each truck visits only one forest area and one mill in any given trip; it thus operates in a truck-load setting. We assume that at each supply point there is a single log-loader that ensures the loading of trucks (idem for demand points). There is also a constraint of stock at each woodmill (per product) which implies an integration between days.

The log-truck scheduling problem (LTSP) is closely related to some routing problems encountered in other industries, in particular, so-called "pick-up and delivery problems" with time windows. In general,

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