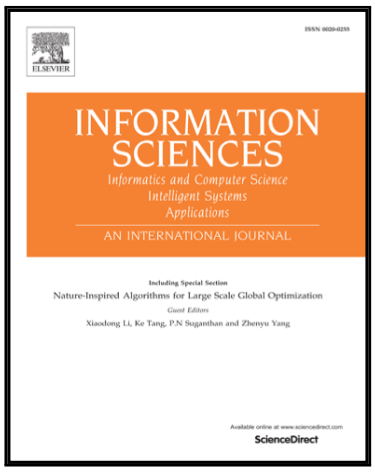

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A hybrid algorithm for a Vehicle Routing Problem with Realistic Constraints

Defu Zhang[a], Sifan Cai[a], Furong Ye[a], Yain-Whar Si[b], and Trung Thanh Nguyen[c]

[a]*School of Information Science and Engineering, Xiamen University, Xiamen, China.*
[b]*Department of Computer and Information Science, University of Macau, Macau, China*
[c]*Department of Maritime and Mechanical Engineering, Liverpool John Moores University, Liverpool, England*

Abstract

Proliferation of multi-national corporations and extremely competitive business environments have led to an unprecedented demand for third-party logistics services. However, recent studies on the Vehicle Routing Problem (VRP) have considered only simple constraints. They also do not scale well to real-world problems that are encountered in the logistics industry. In this paper, we introduce a novel vehicle routing problem with time window and pallet loading constraints; this problem accounts for the actual needs of businesses in the logistics industry such as the delivery of consumer goods and agricultural products. To solve this new VRP, we propose a hybrid approach by combining Tabu search and the Artificial Bee Colony algorithm. A new benchmark data set is generated to verify the performance of the proposed algorithm because the proposed VRP has never been reported in the literature. Experiments are performed for a data set of Solomon's 56 vehicle routing problem with time windows. Our approach is superior to a number of other heuristic algorithms in a comparison on Solomon's VRPTW instances.

Keywords: Vehicle routing problem; Container loading; Tabu search; Artificial Bee Colony algorithm.

1. Introduction

The vehicle routing problem (VRP) is a classical problem from the logistics and transportation fields. It is concerned with route planning for vehicles that start from a central depot and go to a set of customers. Due to its wide range of applications in both commercial and public entities, the VRP is considered to be one of the most important problems in