

A Hybrid Algorithm Based on Greedy Randomized Adaptive Search Procedure and Chemical Reaction Optimization for the Vehicle Routing Problem with Hard Time Windows

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Abstract : The Vehicle Routing Problem with Hard Time Windows (VRPHTW) is a basic distribution management problem that models many real-world problems. The objective of the problem is to deliver a set of customers with known demands on minimum-cost vehicle routes while satisfying vehicle capacity and hard time windows for customers. In this paper, we propose to deal with our optimization problem by using a new hybrid stochastic algorithm based on two metaheuristics: Chemical Reaction Optimization (CRO) and Greedy Randomized Adaptive Search Procedure (GRASP). The first method is inspired by the natural process of chemical reactions enabling the transformation of unstable substances with excessive energy to stable ones. During this process, the molecules interact with each other through a series of elementary reactions to reach minimum energy for their existence. This property is embedded in CRO to solve the VRPHTW. In order to enhance the population diversity throughout the search process, we integrated the GRASP in our method. Simulation results on the base of Solomon's benchmark instances show the very satisfactory performances of the proposed approach.

Keywords : Benchmark Problems, Combinatorial Optimization, Vehicle Routing Problem with Hard Time Windows, Metaheuristics, Hybridization, GRASP, CRO

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