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APPLICATION OF EVOLUTIONARY APPROACH TO SOLVING VEHICLE ROUTING PROBLEM WITH TIME WINDOWS[1]

Abstract: This article deals with software support to the vehicle routing problem with time windows (VRPTW) on the basis of evolutionary algorithms. Since the vehicle routing problem with time windows belongs to the group of NP-hard problems, the use of optimisation techniques seems to be relatively complicated; therefore nowadays many researchers turn their attention to the application of alternative computational techniques that are inspired by evolutionary biology. Besides the unconstrained problems with continuous variables, the evolutionary algorithms may be used also for dealing with constrained problems with discrete variables; however, their use requires the techniques that enable to decode a candidate solution into the problem solution so that all given criteria are met. The authors present their own approach for the purposes of coding and decoding the VRPTW that enables to use a lot of evolutionary techniques.

Keywords: vehicle routing problem with time windows, evolutionary algorithms

JEL: C 6, C 61, C 63

Introduction

Recently, the most discussed problems related to the depletion of non-renewable resources are those that are necessary for car propulsion; consequently, they increase the cost (oil crisis, gas crisis), and result in an increased interest in the development of instruments that enable the optimisation. The efficiency can be also increased by force of quantitative approaches that are aimed at optimisation of physical distribution of the goods and distribution costs. Related optimisation problems are routing and scheduling problems: shortest path problem, travelling salesman problem, vehicle routing problem, fixed schedule problem, pick-up and delivery problem, etc.

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