

A Multidimensional Genetic Algorithm Applicable for Our VRP Variant Dealing with the Problems of Infrastructure Defaults SVRDP-CMTW: “Safety Vehicle Routing Diagnosis Problem with Control and Modified Time Windows”

Authors : Ben Mansour Mouin, Elloumi Abdelkarim

Abstract : We will discuss the problem of routing a fleet of different vehicles from a central depot to different types of infrastructure-defaults with dynamic maintenance requests, modified time windows, and control of default maintained. For this reason, we propose a modified metaheuristic to solve our mathematical model. SVRDP-CMTW is a variant VRP of an optimal vehicle plan that facilitates the maintenance task of different types of infrastructure-defaults. This task will be monitored after the maintenance, based on its priorities, the degree of danger associated with each default, and the neighborhood at the black-spots. We will present, in this paper, a multidimensional genetic algorithm “MGA” by detailing its characteristics, proposed mechanisms, and roles in our work. The coding of this algorithm represents the necessary parameters that characterize each infrastructure-default with the objective of minimizing a combination of cost, distance and maintenance times while satisfying the priority levels of the most urgent defaults. The developed algorithm will allow the dynamic integration of newly detected defaults at the execution time. This result will be displayed in our programmed interactive system at the routing time. This multidimensional genetic algorithm replaces N genetic algorithm to solve P different type problems of infrastructure defaults (instead of N algorithm for P problem we can solve in one multidimensional algorithm simultaneously who can solve all these problems at once).

Keywords : mathematical model, VRP, multidimensional genetic algorithm, metaheuristics

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