PARALLEL BIASED RANDOM KEY GENETIC ALGORITHM FOR VEHICLE ROUTING PROBLEM WITH TIME WINDOWS - A SPEED UP ANALISYS

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ABSTRACT

Parallelism is as a technique for speeding up programs execution. However, the selection of the correct configuration of the algorithm and the parallelization is crucial for its success. The current literature presents three configurations for parallelizing the metaheuristic Biased Random Key Genetic Algorithm - BRKGA. The goal of this paper is to verify which configuration setting optimizes the performance of the parallel BRKGA, when it is applied to the Vehicle Routing Problem with Time Windows – VRPTW. The numerical results demonstrated that the parallel BRKGA had a super linear speed up improvement, in most of instances, after added more processors to find a specific target. If it is setup to find a particular target value, the average execution time of the BRKGA-VRPTW heuristic was faster in 8.93% of the instances when the BRKGA was used monopopulational configuration. The multipopulational with exchange elite configuration is faster in 1.79% of the instances, and in 89.29% of the instances, the fastest is the multipopulational without exchange elite configuration. However, after 1000 generations, the best solutions were presented by monopopulational configuration in 60.71% of the instances, while in 37.50% of the instances, the best solution was found with the multipopulational configuration without exchange elite, in the same time then multipopulational configuration with exchange elite found a better result of 1.79% in its instances.

KEYWORDS. Vehicle Routing, Parallelism, BRKGA.