
The Multi-Objective Capacitated Vehicle Routing Problems with Multiple Trips

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Abstract

The Multi-Objective Capacitated Vehicle Routing Problems with Multiple Trips (MO-MTCVRP) will be defined as the Capacitated Vehicle Routing Problems with Multiple Trips where the objectives are: minimization of the number of vehicles, of the total travel cost, and of the maximum latency (accumulate visiting time for the last customer).

The MO-MTCVRP deals with the transportation and distribution activities in humanitarian logistic operations in a natural way, as a multi-objective vehicle routing problem with multiple trips. Since the fleet of vehicles in a disaster scenario is often reduced, and the capacity of the vehicles is limited, then the need for multiple trips is more than justified.

Additionally, if we focus on the objective functions, we need to take the importance of reducing costs, that is, the minimization of the number of vehicles and of their total traveling cost, and it is also crucial to provide a fast response in a disaster situation, that is, to minimize the maximum latency, i.e., the minimization of the waiting time of the last affected victim in the disaster area, rather than the total waiting time, as is usually carried out in other logistics operations.

The model under consideration (MO-MTCVRP), is clearly not only useful in this context, but it can also be extended or adapted to other real-world situations, as medical transport operations. For the purpose of producing high-quality solutions, a Multi-Start Algorithm with Intelligent Neighborhood Selection is designed and then compared with one of the reference in the literature, to prove its superiority.

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