
Vehicle routing problem with deadline and stochastic waiting time

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Abstract

In this work a new variant of stochastic vehicle routing (VRP) problem is developed. This new variant is called vehicle routing problem with stochastic waiting time and deadline. This variant is motivated for a real-world problem of the food industry for perishable products in which the vehicles could arrive to the customer place before an established deadline. In this case, a vehicle must wait a random time before being attended.

This problem is originally formulated as a chance constrained programming model. First, an MIP (Mixed Integer Programming) approach is used to solve the proposed model. Then, in order to compare the performances, a Tabu Search based approach is also proposed and implemented. The models seek to minimize the number of needed vehicles and the travel cost.

A comparison of both approaches was carried out taking as a performance measure the travel cost to investigate the algorithmic performance, the computational results are also reported.

Obtained results show that the MIP approach has relevant performances but only relative small instances can be solved. Despite that, the Tabu Search approach could manage significant amount of instances with a comparable level of performance. The proposed approach is useful in order to represent in a more accurate way real travel problems and improve the customer service level.

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