# Optimizing the Profitable k-Traveling Repairman Problem under Uncertainty: A Comprehensive Metaheuristic Framework

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Most real-world applications arising in the logistic field are somehow affected by time related parameters. For example, in the case of emergency aids and perishable products or the delivery of maintenance and repair services, the arrival time is the first concern to deal with. As a time related factor, the performance of arrival time, is highly affected by parameters which are in nature uncertain. The fluctuations in the weather condition, traffic congestion, or the vehicle breakdown all have significant impacts on the arrival time and lead us to recognize the travel time as stochastic parameter.

In this talk, we introduce the stochastic profitable k-traveling repairman problem. The travel time over an edge is considered as a stochastic parameter for which the first and the second moments of the distribution are known. Additionally, corresponding to each demand node, a profit value (priority-level) is assigned indicating the initial reward associated with the node. This profit decreases with the increase of arrival time and is regarded as the total revenue collected by visiting the node.

The stochastic profitable k-traveling repairman problem aimed at finding a subset of demand nodes to be served and the order of visiting them by a fleet of k vehicles such that the total revenue is maximized.

Considering the complexity of the problem, inherited from the incorporation of the stochasticity as well as the $NP-$hardness of the routing problems, we propose a general metaheuristic framework which embodies different variants. The efficiency of the proposed approach is supported by the preliminary computational results collected on a set of benchmark instances adapted from the literature.

## References

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