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Solving a discrete congested multi-objective location problem by hybrid simulated annealing with customers' perspective

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Abstract

In the current competitive market, obtaining a greater share of the market requires consideration of the customers' preferences and meticulous demands. This study addresses this issue with a queuing model that uses multi-objective set covering constraints. It considers facilities as potential locations with the objective of covering all customers with a minimum number of facilities. The model is designed based on the assumption that customers can meet their needs by a single facility. It also considers three objective functions, namely minimizing the total number of the assigned server, minimizing the total transportation and facility deployment costs, and maximizing the quality of service from the customers' point of view. The main constraint is that every center should have less than b numbers of people in line with a probability of at least α upon the arrival of a new customer. The feasibility of the approach is demonstrated by several examples which are designed and optimized by a proposed hybrid Simulated Annealing (SA) algorithm to evaluate the model's validity. Finally, the study compares the performance of the proposed algorithm with that of Variable Neighborhood Search (VNS) algorithm and concludes that it can arrive at an optimal solution in much less time than the VNS algorithm.

Keywords: Location-allocation, Queuing, Modeling, Optimization, VNS, SA, Multi-objective.