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Heuristic Methods for the Capacitated Location- Allocation Problem with Stochastic Demand

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Abstract : The proper number and appropriate locations of service centers can save cost, raise revenue and gain more satisfaction from customers. Establishing service centers is high-cost and difficult to relocate. In long-term planning periods, several factors may affect the service. One of the most critical factors is uncertain demand of customers. The opened service centers need to be capable of serving customers and making a profit although the demand in each period is changed. In this work, the capacitated location-allocation problem with stochastic demand is considered. A mathematical model is formulated to determine suitable locations of service centers and their allocation to maximize total profit for multiple planning periods. Two heuristic methods, a local search and genetic algorithm, are used to solve this problem. For the local search, five different chances to choose each type of moves are applied. For the genetic algorithm, three different replacement strategies are considered. The results of applying each method to solve numerical examples are compared. Both methods reach to the same best found solution in most examples but the genetic algorithm provides better solutions in some cases.

Keywords : location-allocation problem, stochastic demand, local search, genetic algorithm
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