

Shuming Wang¹ ✉, Junzo Watada¹ ✉ and Shamshul Bahar Yaakob^{1, 2} ✉

Abstract

In this paper, a Value-at-Risk (VaR) based fuzzy random facility location model (VaR-FRFLM) is built in which both the costs and demands are assumed to be fuzzy random variables, and the capacity of each facility is unfixed but a decision variable. A hybrid approach based on modified particle swarm optimization (MPSO) is proposed to solve the VaR-FRFLM. In this hybrid mechanism, an approximation algorithm is utilized to compute the fuzzy random VaR, a continuous Nbest-Gbest-based PSO and a genotype-phenotype-based binary PSO vehicles are designed to deal with the continuous capacity decisions and the binary location decisions, respectively, and two mutation operators are incorporated into the PSO to further enlarge the search space. A numerical experiment illustrates the application of the proposed hybrid MPSO algorithm and lays out its robustness to the parameter settings when dealing with the VaR-FRFLM.