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## Two swarm intelligence-based approaches for the $p$ -centre problem

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### Abstract

The  $p$ -centre problem is an important facility location problem. In this problem, the objective is to find a set  $Y$  of  $p$  vertices on an undirected weighted graph  $G = (V, E)$  in such a way that  $Y \subseteq V$  and the maximum distance over all the distances from vertices to their closest vertices in  $Y$  is minimised. The vertices in set  $Y$  are called centres. In this paper, we have proposed two swarm intelligence-based approaches for the  $p$ -centre problem. The first approach is based on artificial bee colony (ABC) algorithm, whereas the latter approach is based on invasive weed optimisation (IWO) algorithm. The ABC algorithm and IWO algorithm are relatively new metaheuristic techniques inspired respectively from collective intelligent behaviour shown by honeybees while foraging and the sturdy process of weed colonisation and dispersion in an ecosystem. Computational results on the well-known benchmark instances of  $p$ -centre problem show the effectiveness of our approaches in finding high quality solutions.

**Keywords:** artificial bee colony algorithm, facility location problem, invasive weed optimisation algorithm,  $p$ -centre problem, swarm intelligence

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