BATS ECHOLOCATION-INSPIRED ALGORITHMS FOR
GLOBAL OPTIMISATION PROBLEMS

by

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Abstract

Swarm intelligence algorithms, are among popular metaheuristic methods, developed and inspired by the collective behaviour of swarms that have attracted significant attention of researchers. The works related to swarm intelligence algorithms include the development of the algorithm itself, its modification and improvisation as well as its application in solving global optimisation problems. This thesis presents works on swarm intelligence algorithms that are inspired by real echolocation of a colony of bats and its performance evaluation to solve optimisation problems. The aim of the research is to introduce novel form of swarm intelligence algorithms based on real echolocation behaviour of bats. An adaptive bats sonar algorithm is proposed for solving single objective optimisation problems. A modified adaptive bats sonar algorithm is then proposed for solving constrained optimisation problems. Furthermore, a dual-particle swarm optimisation-modified adaptive bats sonar algorithm is proposed for solving multi objective optimisation problems. The algorithm is a hybrid algorithm that operates using dual level search strategy that takes merits of a particle swarm optimisation algorithm and a modified adaptive bats sonar algorithm. The superior performances of the developed bats echolocation-inspired algorithms are verified through rigorous tests with optimisation benchmark test functions and problems. Further, the performances of the developed algorithms are assessed in solving selected practical problems in business, mechanical/manufacturing engineering and electrical engineering fields. The results validate the better performance of the developed algorithms in single objective optimisation, constrained optimisation and multi objective optimisation problems of various fields.