

An improved genetic bat algorithm for unconstrained global optimization problems

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Abstract:

Metaheuristic search algorithms have been in use for quite a while to optimally solve complex searching problems with ease. Nowadays, nature inspired swarm intelligent algorithms have become quite popular due to their propensity for finding optimal solutions with agility. Genetic algorithm (GA) is successfully applied in several engineering fields for the past four decades but it still has a problem of slow convergence due to its reliability on the initial state of its operators. Therefore, to ensure that GA converges to a global solution, this paper proposed a two-stage improved Genetic Bat algorithm (GBa) in which the GA finds the optimal solution first and then Bat starts from where the GA has converged. This multi-stage optimization ensures that optimal solution is always reached through fine balance in between exploration and exploitation behavior of Genetic algorithm.

Keywords: Genetic Bat algorithm (GBa); Genetic Algorithm (GA); Multi-Stage

References

1. David H. Ackley. 1987. An empirical study of bit vector function optimization. *Genet. algorithms simulated annealing* 1, (1987), 170--204.
2. Gerardo Beni and Jing Wang. 1993. Swarm Intelligence in Cellular Robotic Systems. In *Robots and Biological Systems: Towards a New Bionics? NATO ASI Series Volume 102*, 703--712. DOI:https://doi.org/10.1007/978-3-642-58069-7_38
3. Christian Blum, Maria Jos, Blesa Aguilera, Andrea Roli, and Michael Sampels. 2008. *Hybrid Metaheuristics: An Emerging Approach to Optimization*. Springer Berlin Heidelberg.
4. PenChen Chou and JenLian Chen. 2011. Enforced Mutation to Enhancing the Capability of Particle Swarm Optimization Algorithms. *Adv. Swarm Intell.* (2011), 28--37.
5. A Collignan, J Pailhes, and P Sebastian. 2011. Design optimization: management of large solution spaces and optimization algorithm selection. In *IMProVe*, Venice.