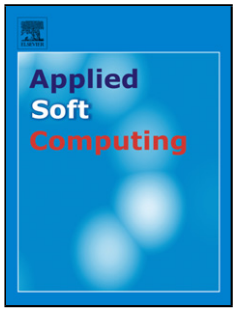

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NeSS: A Modified Artificial Bee Colony Approach Based on Nest Site Selection Behavior

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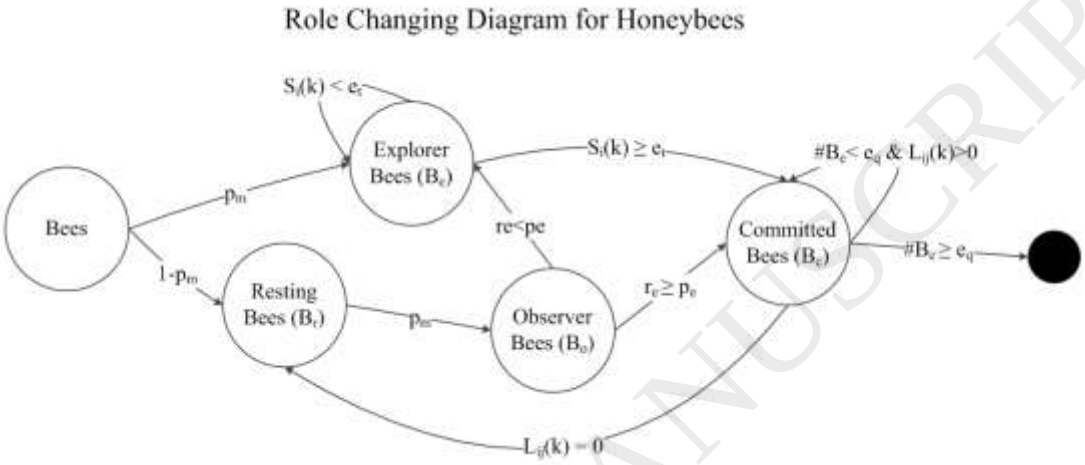
Graphical abstract



Highlights

- We propose an optimization algorithm based on bees' nest-site selection behavior.
- We validated the algorithm performance on the traveling salesman and clustering problems.
- A quorum mechanism provides the stopping criterion instead of maximum cycle number.
- The convergent speed was gained without reduction in solution quality.
- The results show promising performance in solving combinatorial problems.

Abstract

This paper proposes a new version of the Artificial Bee Colony (ABC) optimization algorithm based on the natural nest-site selection behavior of honey bee swarms. The algorithm offers three advantages. First, the responsibility of bees in the proposed algorithm is dynamic, meaning that bee agents may change states (explorer, resting, observer, and committed) during the execution. New feasible solutions are randomly generated in every iteration by varying the numbers of bee agents, thus introducing diversified candidate solutions into the solution space. Second, each bee records its own satisfaction with each nest-site and this satisfaction value is added to the quality measure for the nest site, allowing lower quality nest sites to be retained as candidate solutions and again providing greater diversity. Third, a quorum mechanism provides the stopping criterion, instead of the maximum cycle number (MCN). This mechanism helps the algorithm to converge more quickly. Experiments on the traveling