A novel bat algorithm with dynamic membrane structure for optimization problems

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To improve the optimization efficiency for different optimization problems and take advantage of the dynamic membrane computing framework, this paper proposes an improved bat algorithm, namely, Dynamic Membrane-driven Bat Algorithm (DMBA). The dynamic construction of the DMBA algorithm aims at enhancing population diversity by balancing the exploration-exploitation tradeoff. Unlike the static membrane algorithms, the membranes in DMBA will be dynamically evolved by using merging and separation rules which help in maintaining the diversity of the population. The experimental results on a set of well-known benchmark functions including CEC 2005, CEC 2011, and CEC 2017 clearly prove the effectiveness of the proposed DMBA algorithm in terms of maintaining the diversity and exploitation capabilities compared to that of the others. It is shown that the proposed DMBA algorithm is superior to recent variants of the bat algorithm and other well-known algorithms in terms of solution accuracy and convergence speed.

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