Computational Chemotaxis in Micro Bacterial Foraging Optimization for High Dimensional Problems: A Comparative Study on Numerical Benchmark

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Abstract

Nature and bio-inspired algorithms have been recently used for solving high dimensional search and optimization problems. In this context, bacterial foraging optimization algorithm (BFOA) has been widely employed as a global optimization technique inspired from social foraging behavior of Escheria coli bacteria. In this paper, a novel hybrid technique called micro Chemotaxis Differential Evolution Optimization Algorithm (CDEOA) that uses a small population is proposed. In this technique, we incorporate the principles of DE (Differential Evolution) into BFOA. The best bacterium retains its position whereas the rest of the population are reinitialized on the search space. CDEOA was compared with classical BFOA with two different population sizes and micro BFOA (BFOA) over a suite of 16 numerical optimization problems taken from P.N. Suganathan. Statistics of the computer simulations indicate that CDEOA outperforms, or is comparable to, its competitors in terms of its convergence rates and quality of final solution for complex high dimensional problems.
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