

Multi-Objective Optimization Algorithm Based on Sperm Fertilization Procedure (MOSFP)

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In this paper, we propose an extended multi-objective version of single objective optimization algorithm called sperm swarm optimization algorithm. The proposed multi-objective optimization algorithm based on sperm fertilization procedure (MOSFP) operates based on Pareto dominance and a crowding factor, that crowd and filter out the list of the best sperms (global best values). We divide the sperm swarm into three equal parts, after that, different types of turbulence (mutation) operators are applied on these parts, such as uniform mutation, non-uniform mutation, and without any mutation. Our algorithm is compared against three well-known algorithms in the field of optimization. These algorithms are NSGA-II, SPEA2, and OMOPSO. These algorithms are compared using a very popular benchmark function suites called Zitzler-Deb-Thiele (ZDT) and Walking-Fish-Group (WFG). We also adopt three quality metrics to compare the convergence, accuracy, and diversity of these algorithms, including, inverted generational distance (IGD), spread (SP), and epsilon (ϵ). The experimental results show that the performance of the proposed MOSFP is highly competitive, which outperformed OMOPSO in solving problems such as ZDT3, WFG5, and WFG8. In addition, the proposed MOSFP outperformed both of NSGA-II or SPEA2 algorithms in solving all the problems.

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