Lecture by

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Evolutionary constrained multiobjective optimization

约束多目标进化优化

Constrained multiobjective optimization problems (CMOPs) widely exist in scientific research and practical applications. They involve multiple objectives to be optimized and various constraints to be satisfied, which proposes serious challenges for solvers. During the past several decades, evolutionary algorithms have been widely used to solve multiobjective optimization problems because they have better global search ability and can output a set of non-dominated solutions.

In this report, CMOPs and research difficulties will be described in detail. Then, three kinds of constrained multiobjective evolutionary algorithms, including objective information utilization-based evolutionary algorithms, evolutionary multitasking-based evolutionary algorithms, and constrained multi-modal multiobjective evolutionary algorithms, will be introduced. For objective information utilization-based evolutionary algorithms, single-phase and two-phase algorithms will be introduced, and they mainly utilize objective information to explore infeasible regions and maintain diversity. For evolutionary multitasking-based evolutionary algorithms, they transform a CMOP into a multitasking optimization problem by creating simple auxiliary tasks with fewer constraints. Moreover, two algorithms focus on what to transfer and the form of auxiliary task will be introduced. For constrained multi-modal multiobjective evolutionary algorithms, they consider the multi-modal characteristics and aim to find multiple equivalent feasible Pareto optimal solution sets. Meanwhile, a new benchmark test suite and a new performance indicator will be introduced. Finally, the future works on evolutionary constrained multiobjective optimization will be given.

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