Multi-objective intelligent optimization under complex constraints and dynamic environments: theory, algorithms and engineering applications

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Operational decision-making in real-world engineering systems commonly faces challenges such as conflicting objectives, complex constraints, time-varying operating conditions, partially unobservable states, and expensive objective function evaluations. Traditional mathematical programming and static single-objective methods struggle to obtain solution sets that simultaneously balance convergence, diversity, and robustness. In recent years, multi-objective evolutionary optimization has continued to advance in constraint handling, dynamic response, expensive optimization, and high-dimensional scalability, and has deeply integrated with surrogate models, transfer learning, deep learning, and knowledge-guided strategies, forming a new paradigm of learning-assisted evolutionary optimization. However, prominent challenges remain in the efficient exploration of feasible regions, change detection and knowledge reuse, sample efficiency under expensive evaluations, and multi-criteria decision-making from Pareto solution sets to a single engineering solution.

This special issue focuses on multi-objective evolutionary optimization under complex constraints and dynamic environments. It solicits evolutionary optimization algorithms and theories for constrained, dynamic, expensive, high-dimensional, and preference-driven problems; surrogate model management and small-sample search; knowledge-guided and transfer optimization; synergistic paradigms of evolutionary computation and deep learning; and their validated applications in complex engineering systems, with the aim of promoting the interdisciplinary integration of computational intelligence and systems science. We invite the submission of high-quality papers related to recent advances in these emerging topics, including but not limited to the following:

- ❉ Algorithms and Theory for Constrained, Dynamic, Expensive, High-Dimensional, and Preference-Driven Evolutionary Optimization
- ❉ Model Management and Small-Sample Search in Surrogate-Assisted Evolutionary Optimization
- ❉ Knowledge-Guided and Transfer-Based Evolutionary Optimization Methods
- ❉ Synergistic Paradigms of Evolutionary Computation and Deep Learning
- ❉ Validation and Application of Evolutionary Optimization in Complex Engineering Systems

If you would like to know more about the topic, please contact Prof. Eerchao Li by email: **lecstarr@163.com**