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# Quantum-behaved Discrete Multi-objective Particle Swarm Optimization for Complex Network Clustering

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## Abstract

Complex network research has attracted lots of attention in both academic community and various application fields. Complex network clustering, as one of the key issues in complex network, explores the internal organization of the nodes in a complex network. The discrete particle swarm optimization strategy has been successfully proposed for network clustering, while the existing method works with weak robustness. In this paper, we model the task of complex network clustering as a multi-objective optimization problem and solve the problem with the quantum mechanism based particle swarm optimization algorithm, which is a parallel algorithm. To our knowledge, this is the first attempt to apply the quantum mechanism based discrete particle swarm optimization algorithm into network clustering. In addition, the non-dominant sorting selection operation is employed for individual replacement. Consequently, a quantum-behaved discrete multi-objective particle swarm optimization algorithm is proposed for complex network clustering. The experimental results demonstrate that the proposed algorithm performs effectively and achieves competitive performance with the state-of-the-art approaches on the extension of Girvan and Newman benchmarks and real-world networks, especially on large-scale networks.

**Keywords:** Multi-objective optimization, Quantum, Discrete particle swarm optimization, Complex networks, Clustering.

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