

## **A novel multi-state particle swarm optimization for discrete combinatorial optimization problems**

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### **ABSTRACT**

Particle swarm optimization (PSO) has been widely used to solve real-valued optimization problems. A variant of PSO, namely, binary particle swarm optimization (BinPSO) has been previously developed to solve discrete optimization problems. Later, many studies have been done to improve BinPSO in term of convergence speed, stagnation in local optimum, and complexity. In this paper, a novel multi-state particle swarm optimization (MSPSO) is proposed to solve discrete optimization problems. Instead of evolving a high dimensional bit vector as in BinPSO, the proposed MSPSO mechanism evolves states of variables involved. The MSPSO algorithm has been applied to two benchmark instances of traveling salesman problem (TSP). The experimental results show that the the proposed MSPSO algorithm consistently outperforms the BinPSO in solving the discrete combinatorial optimization problem.

### **KEYWORDS:**

particle swarm optimization; binary particle swarm optimization; state; decision conflict

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