Abstract

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Performance Analysis and Tuning for Parallelization of Ant Colony Optimization by Using OpenMP

Ant colony optimization algorithm (ACO) is a soft computing metaheuristic that belongs to swarm intelligence methods. ACO has proven a well performance in solving certain NP-hard problems in polynomial time. This paper proposes the analysis, design and implementation of ACO as a parallel metaheuristics using the OpenMP framework. To improve the efficiency of ACO parallelization, different related aspects are examined, including scheduling of threads, race hazards and efficient tuning of the effective number of threads. A case study of solving the traveling salesman problem (TSP) using different configurations is presented to evaluate the performance of the proposed approach. Experimental results show a significant speedup in execution time for more than 3 times over the sequential implementation