Abstract

Limited amount of time and computational resources in industrial domain makes Ant Colony Optimization (ACO) a useful approach to find near optimal solutions in polynomial time for Nondeterministic Polynomial time (NP) problems. For dynamically changing graphs, such as in case of network routing and urban transportation systems which are based on Travelling Salesman Problem (TSP), the ant colony algorithm is superior to simulated annealing and genetic algorithm approaches as it can be run continuously and acclimatize to changes in real time. The objective of this paper is to find a competent method which improves ACO in terms of iteration count and ability to find better solutions for TSP so that it can be used in different areas like industrial and educational, for solving NP problems more efficiently. This paper proposes a modified ant colony optimization (MACO) algorithm which uses the peculiarity of Elitist Ant System (EAS) and Ant Colony System (ACS). Using EAS property, the convergence speed is optimized by additional pheromone deposition on the arcs of the best tour and pseudorandom proportional rule and local pheromone update of ACS tunes the degree of exploration and prevents the algorithm from stagnation. The experiments done on benchmark datasets from TSPLIB manifest clearly that MACO has an upper hand in terms of performance on conventional ACO, ACO-GA and ACO-PSO.
References


- Li, Y. M. ; Xu, Z. B. An ant colony optimization heuristic for solving maximum independent set problems. Fifth International Conference on Computational Intelligence and Multimedia Applications; 2003; pp 206-211.
- Gomez, J. F. ; Khodr, H. M. ; DeOliveira, P. M. ; et al. Ant Colony System Algorithm for

**Index Terms**

Computer Science  
Algorithms

**Keywords**

Ant Colony Optimization (ACO)  
Travelling Salesman Problem (TSP)  
Modified Ant Colony Optimization (MACO)

Swarm Intelligence (SI).