

Performance Analyses of Nature-inspired Algorithms on the Traveling Salesman's Problems for Strategic Management

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ABSTRACT

This paper carries out a performance analysis of major Nature-inspired Algorithms in solving the benchmark symmetric and asymmetric Traveling Salesman's Problems (TSP). Knowledge of the workings of the TSP is very useful in strategic management as it provides useful guidance to planners. After critical assessments of the performances of eleven algorithms consisting of two heuristics (Randomized Insertion Algorithm and the Honey Bee Mating Optimization for the Travelling Salesman's Problem), two trajectory algorithms (Simulated Annealing and Evolutionary Simulated Annealing) and seven population-based optimization algorithms (Genetic Algorithm, Artificial Bee Colony, African Buffalo Optimization, Bat Algorithm, Particle Swarm Optimization, Ant Colony Optimization and Firefly Algorithm) in solving the 60 popular and complex benchmark symmetric Travelling Salesman's optimization problems out of the total 118 as well as all the 18 asymmetric Travelling Salesman's Problems test cases available in TSPLIB91. The study reveals that the African Buffalo Optimization and the Ant Colony Optimization are the best in solving the symmetric TSP, which is similar to intelligence gathering channel in the strategic management of big organizations, while the Randomized Insertion Algorithm holds the best promise in asymmetric TSP instances akin to strategic information exchange channels in strategic management.

KEYWORDS

Decision-making; logistics management; nature-inspired algorithms; performance analysis; strategic planning; traveling salesman's problems