Traveling Salesman Problem Using Genetic Algorithm A Survey

Travelling salesman problem theory of computational complexity, the travelling salesman problem (TSP) asks the following question: "Given a list of cities and the distances between In the theory of computational complexity, the travelling salesman problem (TSP) asks the following question: "Given a list of cities and the distances between each pair of cities, what is the shortest possible route that visits each city exactly once and returns to the origin city. " It is an NP-hard problem in combinatorial optimization, important in theoretical computer science and operations research 75463a67f6

Metaheuristic Metaheuristics may make relatively few assumptions about the optimization problem being solved and so may be usable for a variety of problems. Tomoiagă B, Chindriş M, Sumper A, Sudria-Andreu A, Villafafila-Robles In computer science and mathematical optimization, a metaheuristic is a higher-level procedure or heuristic designed to find, generate, tune, or select a heuristic (partial search algorithm) that may provide a sufficiently good solution to an optimization problem or a machine learning problem, especially with incomplete or imperfect information or limited computation capacity. 13 (4). (2002). Complex Systems. Their use is always of interest when exact or other (approximate) methods are not available or are not expedient, either because the calculation time is too. "Memetic Algorithms for the Traveling Salesman Problem". Metaheuristics sample a subset of solutions which is otherwise too large to be completely enumerated or otherwise explored 75463a67f6

Vehicle routing problem vehicles used or travelled distance are also considered. Often, the context is that of delivering goods located at a central depot to customers who have placed orders for such goods. g, collection of solid waste and the transport of the elderly and the sick to and from health-care facilities. The VRP generalises the travelling salesman problem (TSP), which is equivalent to requiring a single The vehicle routing problem (VRP) is a combinatorial optimization and integer programming problem which asks "What is the optimal set of routes for a fleet of vehicles to traverse in order to deliver to a given set of customers. The standard objective of the VRP is to minimise the total route cost. However, variants of the problem consider, e. " The problem first appeared, as the truck dispatching problem, in a paper by George Dantzig and John Ramser in 1959, in which it was applied to petrol deliveries. Other objectives, such as minimising the number of vehicles 75463a67f6

Memetic algorithm Pattern Analysis In computer science and operations research, a memetic algorithm (MA) is an extension of an evolutionary algorithm (EA) that aims to accelerate the evolutionary search for the optimum. J. An MA uses one or more suitable heuristics or local search techniques to improve the quality of solutions generated by the EA and to speed up the search. An EA is a metaheuristic that reproduces the basic principles of biological evolution as a computer algorithm in order to solve challenging optimization or planning tasks, at least approximately. (1998). ; Colmenares, A. The effects on the reliability of finding the global optimum depend on both the use case and the design of the MA. "Resolution of pattern recognition problems using a hybrid genetic/random neural network learning algorithm" 75463a67f6

The problem of finding the shortest path between two intersections on a road map may be modeled as a special case of the shortest path problem in graphs, where the vertices correspond to intersections and the edges correspond to road segments, each weighted by the length or distance of each segment. 75463a67f6 Memetic algorithms represent one of the recent growing areas of research in evolutionary computation. The term MA is now widely used as a synergy of evolutionary... 75463a67f6

Shortest path problem Bellman–Ford algorithm solves the single-source problem if edge weights may be negative. A* search algorithm solves for single-pair shortest path using heuristics In graph theory, the shortest path problem is the problem of finding a path between two vertices (or nodes) in a graph such that the sum of the weights of its constituent edges is minimized 75463a67f6

The travelling purchaser problem, the vehicle routing problem and the ring star problem are three generalizations of TSP. 75463a67f6

Genetic algorithm Some examples of GA applications include optimizing decision trees for better performance, solving sudoku puzzles, hyperparameter optimization, and causal inference. Genetic algorithms are commonly used to generate high-quality solutions to optimization and search problems via biologically inspired In computer science and operations research, a genetic algorithm (GA) is a metaheuristic inspired by the process of natural selection that belongs to the larger class of evolutionary algorithms (EA). evolutionary algorithms (EA). Genetic algorithms are commonly used to generate high-quality solutions to optimization and search problems via biologically inspired operators such as selection, crossover, and mutation 75463a67f6

Ant colony optimization algorithms They have an advantage over simulated annealing and genetic algorithm approaches In computer science and operations research, the ant colony optimization algorithm (ACO) is a probabilistic technique for solving computational problems that can be reduced to finding good paths through graphs. been used to produce near-optimal solutions to the travelling salesman problem. Artificial ants represent multi-agent methods inspired by the behavior of real ants 75463a67f6

List of metaphor-based metaheuristics It is often used when the search space is This is a chronologically ordered list of metaphor-based metaheuristics and swarm intelligence algorithms, sorted by decade of proposal. Simulated annealing is a probabilistic algorithm inspired by annealing, a heat treatment method in metallurgy 75463a67f6

Chromosome (evolutionary algorithm) ; Dizdarevic, S. (1999). Murga, R. "Genetic Algorithms for the Travelling Salesman Problem: A Review of Representations and Operators". They determine one or more phenotypic characteristics of the individual or at least have an influence on them. A chromosome is composed of a set of genes, where a gene consists of one or more semantically connected parameters, which are often also called decision variables. The set of all solutions, also called individuals according to the biological model, is known as the population. Artificial A chromosome or genotype in evolutionary algorithms (EA) is a set of parameters which define a proposed solution of the problem that the evolutionary algorithm is trying to solve. ; Inza, I. H. The genome of an individual consists of one, more rarely of several, chromosomes and corresponds to the

genetic representation of the task to be solved. In the basic form of genetic algorithms, the chromosome is represented as a binary 75463a67f6

List of genetic algorithm applications This is a list of genetic algorithm (GA) applications. Bayesian inference links to particle methods in Bayesian statistics and hidden Markov chain models This is a list of genetic algorithm (GA) applications 75463a67f6

As an example, ant colony optimization is a class of optimization algorithms modeled on the actions of an ant colony. Artificial 'ants' (e.g. simulation agents) locate optimal solutions by moving through a parameter... 75463a67f6 The decision version of the TSP (where given a length L, the task is to decide whether the graph has a tour whose length is at most L) belongs to the class of NP-complete problems. Thus, it is possible that the worst-case running time for any algorithm for the TSP increases... 75463a67f6 The pheromone-based communication of biological ants is often the predominant paradigm used. Combinations of artificial ants and local search algorithms have become a preferred method for numerous optimization tasks involving some sort of graph, e.g., vehicle routing and internet routing. 75463a67f6