

Nature-inspired Monte Carlo algorithm for travelling salesman problem

Simone Quadrelli

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Abstract. The aim of this project is to solve the travelling salesman problem (TSP) which consists in finding the shortest hamiltonian cycle (i.e. cycle that pass through each vertex of a graph just once) among all the vertices of a graph. The problem is a *NP-hard* problem and therefore there exist no feasible algorithm to solve it exactly for any possible input. Therefore, the project explores the possibility to exploit simulated annealing and a genetic algorithm to compute with adequate approximation the shortest hamiltonian cycle. The report shows the result of the simulations computed on some cities of northern Italy and compares the exact feasible solutions with the approximated ones. It also provides an analysis of the computational time needed to obtain an exact optimal solution and to obtain an approximatively optimal solution.