

An Improved Method to Compute Sparse Graphs for Traveling Salesman Problem

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Abstract : The Traveling salesman problem (TSP) is NP-hard in combinatorial optimization. The research shows the algorithms for TSP on the sparse graphs have the shorter computation time than those for TSP according to the complete graphs. We present an improved iterative algorithm to compute the sparse graphs for TSP by frequency graphs computed with frequency quadrilaterals. The iterative algorithm is enhanced by adjusting two parameters of the algorithm. The computation time of the algorithm is $O(CN^{\max}n^2)$ where C is the iterations, N^{\max} is the maximum number of frequency quadrilaterals containing each edge and n is the scale of TSP. The experimental results showed the computed sparse graphs generally have less than $5n$ edges for most of these Euclidean instances. Moreover, the maximum degree and minimum degree of the vertices in the sparse graphs do not have much difference. Thus, the computation time of the methods to resolve the TSP on these sparse graphs will be greatly reduced.

Keywords : frequency quadrilateral, iterative algorithm, sparse graph, traveling salesman problem

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