

Supervisor: Dr. György Dósa

Several variants of the Traveling Salesman Problem (TSP)

In this research we consider several variants of the TSP problem.

The basic version is that given a quadratic integer matrix A , where $a(i,j)$ means the cost of the travel from node i to node j , and we look for a travel which visits each node, and has a minimal total cost. This NP-hard problem is widely explored because its practical, and also theoretical importance. Nowadays the problem can be solved optimally if the number of nodes is about 30 thousands.

Several variants can be also of interest, where there are some additional constraints. For example some weight condition is also taken into account, e.g. the travel is performed by a truck, the load of the truck is decreasing as the salesman delivers some kind of product, and there is some weight limit on some edges. It means that several edges can be visited only later, not in the beginning of the travel.

Another version is where there are more travelers, and some edges cannot be used by both of the travelers at the same time.

Another version is where there are many travels, and several edges have some constraint that the edge cannot be used too many times, by some pollution control.

The role of the applicant is to learn the present state of the basic problem, the solutions techniques, and investigating the new variants. Applying the present methods for the new variants.

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Solutions for Industry 4.0

Case studies, software development for supporting Industry 4.0 modules.