Demidenko Conditions and the Vehicle Routing Problem

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The Traveling Salesman Problem (TSP) is one of the most famous NP-hard problems. So, much works have been done to study polynomially solvable cases, that is, to find good conditions for distances between cities such that an optimal tour can be found in polynomial time. These good conditions give some restriction on the optimal tour, for example, Monge property and Demidenko conditions. Moreover, it is significant to find algorithms which compute the shortest tour with the restriction. A pyramidal tour appears frequently in those concepts. For a given complete weighted digraph $G$, a vertex $v$ of $G$, and a positive integer $k$, the Vehicle Routing Problem (VRP) is to find a minimum weight connected subgraph $F$ of $G$ such that $F$ is a union of $k$ cycles sharing only the vertex $x$. In this talk, we apply good conditions for the TSP to the VRP. The author proved that if a given weighted digraph satisfies several conditions, which is known for the TSP, then an optimal solution of the VRP can also be computed in polynomial time. In this talk, we shall focus on Demidenko conditions and prove that the VRP restricted to Demidenko conditions is also polynomial time solvable. We will mainly talk about differences between Demidenko conditions and other known cases of the VRP.

Keywords: the Traveling Salesman Problem, the Vehicle Routing Problem, pyramidal tours and Demidenko conditions

If possible, I would like to have a talk on Monday - Thursday.