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The Dynamic Vehicle Routing Problem with A-priori Information

The Vehicle Routing Problem (VRP) has been studied with much interest within the last three decades. The majority of these works focus on the static and deterministic cases of vehicle routing in which all information is known at the time of the planning of the routes. In most real-life applications though, stochastic and/or dynamic informations occurs parallel to the routes being carried out. Real-life examples of stochastic and/or dynamic routing problems include the distribution of oil to private house-holds and the dispatching of busses for the transportation of elderly and handicapped people. In these examples the composition (i.e. the location, the actual demand) of the customers may not be known at the time of the planning or even at the beginning of the servicing of the customers.

First, we give a short introduction to the Dynamic Vehicle Routing Problem (DVRP) and discuss some of its applications. Next, we present the dynamic version of the well-known Traveling Salesman Problem with Time Windows (TSPTW). The TSPTW is thereafter extended to include information on the arrival process of the immediate request customers. We refer to this extension as the A-priori Dynamic Traveling Salesman Problem with Time Windows (ADTSPTW). A few simple on-line routing policies for the ADTSPTW will be presented. Finally, a case study using real-life data originating from the long-distance courier mail service business will be discussed.