Vehicle Scheduling for Accessible Transportation Systems

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Description

Most large cities in North America provide an accessible transportation system for persons with reduced mobility. In order to manage such systems, GIRO has developed a software suite called "GIRO/ACCÈS", which allows one to build routes satisfying the demand (i.e., a collection of pickup-delivery pairs) through various vehicle types and transportation providers (buses, taxis, etc.). For a given route, the problem consists of finding a planned time for each vehicle stop. Each stop must occur within a precise time window and a quadratic function (which depends upon the stop) is used to define the preferred stop time. At the end of the 1980s, Yvan Dumas et al. (see the reference below) have proposed an efficient algorithm in order to solve this problem, but nowadays we have to take new constraints into account and cannot solve the problem as efficiently as before. Among these new constraints, let us mention those that limit the maximum route span and those that limit the maximum user span (i.e., the maximum time between the pickup and delivery of a given user).

Objective

The objective of the team studiying this problem will be to propose improvements in algorithms or new algorithms in order to solve the problem in an efficient manner.

Reference

Dumas, Y., F. Soumis, and J. Desrosiers. Optimizing the Schedule for a Fixed Vehicle Path with Convex Inconvenience Costs. *Transportation Science* May 1990, vol. 24, no. 2, 145-152.