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Finding 'staff acceptable' routes for road network monitoring^{*}

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Abstract

The routes generated by classical vehicle routing algorithms are often not directly applicable in practice due to numerous operational constraints. The shape of the routes obtained when trying to minimize the total distance is frequently awkward and not acceptable to the drivers because of many back and forth segments. We developed a method to improve the shape of the routes. The method was applied to the monitoring of the road network by patrols of the Ministry of Transportation of Québec.

Key words: Operational logistics, vehicle routing, arc routing, heuristics.

1 Introduction

The surveillance of the road network is conducted daily by patrol trucks of the Quebec Ministry of Transportation. This activity aims at maintaining the safety and the viability of the network by a fast detection of the various incidents occurring on it. The routes for surveillance are planned for two weeks in advance and allow covering the entire network of roads in a given region with specified frequencies according to a route hierarchy. However, due to numerous incidents that call for the patrol to quit its planned route and move to the incident location, most of the surveillance routes are not completed and the following ones have to be replanned constantly.

We first used 'traditional' arc routing algorithms to plan the routes. However those have two drawbacks:

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