
Heuristic Solutions for a Bicriteria Evacuation Scheduling and Transportation Problem

Kaouthar Deghdak^{*†1} and Vincent T'kindt^{*1}

¹Univeristé de Tours, Laboratoire d'Informatique (EA 6300), ERL CNRS OC 6305 – Polytech'Tours – 64 avenue Jean Portalis, 37200 Tours, France

Abstract

We consider the problem of evacuating an urban area to a set of shelter locations after an important disaster. In such a case, many sub-problems arise: when should people be evacuated? What are the best shelters' locations to accommodate evacuees? When and where to transport the evacuees? We consider a multicriteria problem where the bus routing for public transport, the routing for individual traffic, as well as shelter location decisions, have to be decided. The objective is to minimize both the evacuation time and the evacuation risk. This problem was introduced Goerigk, Deghdak and Hessler in 2014 and has been solved by using a multicriteria genetic algorithm. In this contribution, we propose an heuristic based on a decomposition of the evacuation problem into sub-problems. Exact or heuristic algorithms are set up to solve these sub-problems.

The genetic algorithm and the decomposition heuristic have been evaluated on real-world instances modeling Nice city (France) and Kaiserslautern city (Germany). Computational results show that the decomposition heuristic is capable of finding non-dominated solutions that are not calculated by the genetic algorithm. During the conference, we will present detailed comparisons between the two methods in terms of running times and solutions' quality for several instances of Nice city and Kaiserslautern city. Besides, we will present how we can couple the two methods to obtain improved results.

^{*}Speaker

[†]Corresponding author: deghdak.kaouthar@gmail.com