

Personalized outdoor routing: Route planning techniques and algorithms

Kiveli Constantina Diareme

Theodore Tsiligiridis

*Informatics Laboratory
Department of Agricultural Economy and Development
School of Food, Biotechnology and Development
Agricultural University of Athens
75 Iera Odos, 11855 Athens, Greece*

Abstract

Personalized routing for the tourist agenda is looking for a set of control points, usually referred as Points of Interest (POIs) to be visited, so that the total score, benefit or profit is maximized subject to a constraint on the total travel cost or time. A score or profit is associated to each POI, and for each pair of POIs a travel cost is specified. The corresponding tourist planning problem basically coincides with the Team Orienteering Problem with Time Windows (TOPTW) constraints, which is NP-hard problem that arises in vehicle routing and production scheduling framework. Personalized routing aims not only at planning an optimal route, by means of route generation and customization, but also facilitates each user by personalizing their recommendations. Although problems in this category present enormous difficulty to complete search algorithms, various heuristics and local search algorithms, found in the literature, can be applied to create a personalized route especially designed for tourists. Furthermore as a bases to future work an algorithm that solves the OP is presented where the tourist departs from a specified but not fixed point (origin) and returns to it. The algorithm uses TOP methodology to construct an initial route and then OP in order to enhance it and produce an optimal one. After the construction of the initial route heuristics, greedy local search algorithms as well as optimization techniques are implemented in order to optimize the result. Throughout the design of the algorithm consideration was taken upon future extension where starting and ending points would be different and the algorithm should produce as a result more than one optimal routes in order to facilitate not one single tourist/team but several groups. The proposed method is applied in three well known data sets, taken from the literature and is compared to four previously published algorithms. The algorithm proposed in this paper proved to be able to give similar results with previously published algorithms in acceptable computing time, and in some instances outperform them.

KEYWORDS: ROUTING, ALGORITHMS, ORIENTEERING, PERSONILISED ROUTING