Crowdsourcing on In-building Routing System with Personal Preferences across Building Groups

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ABSTRACT

People travel inside building groups from a room in building A to another in building B frequently. Traditional routing system usually provides shortest routes between two coordinates consist of longitudes and latitudes, but does not have knowledge about building structures and detailed floor maps. It does not take users' personal preferences into account when suggesting the routes as well. Such routes generated cannot meet peoples demand. In this paper, we introduce a new system, which provides in-building routes with personal preferences across building groups.

Author Keywords

Crowdsourcing; In-building Routing; Personal Preferences; Mobile Interfaces; Concept of Association; Decision Tree.

INTRODUCTION

introduction In our world, most people are living, working or studying in a group of buildings which could be company buildings, neighbourhoods or campus buildings. People go from one location inside the building-group to another every hour every day. Traditional route planning system provides routes between two coordinates consist of longitudes and latitudes, focusing on finding the shortest route, but does not have knowledge about the inside structures of buildings and floor-detailed environments, and does not take users' personal perferences into account when suggesting the routes. Those routes cannot provide enough details and personal options demanded by people. For example, an employee may need to go to the coffee shop on the first floor of building B from his office on the third floor of building A several times a day. His route choices would be based on the weather condition and his physical condition. He would choose to go through the hallway between the two buildings if it rained or take the elevator if he feels tired. Traditional route planning system would only provide the shortest route from the exit of building B to the entrance of building A regardless of the building structures or floor environments, which cannot meet this employee's actual needs.

Here we want to introduce a new in-building routing system with persoanl preferences, a system with comprehensive knowledge of building structures, floor-level detailed maps, and relevant environments, which provides room-level detailed routes with personal preferences specified by the user. The focus of this system would be mapping the physical features of routes to human preferences which consist of physical requirement, personal feelings, emotional options and etc. The system shall collect route and preference data from people, and then analyze the relationships between human preferences and physical features.

Our system collect the trainning data, which are actual routes each has its personal preferences labeled, by crowdsourcing methods. Crowdsourcing has been successfully used in many fields. We provide an application on mobile devices, which encourages people to record their daily routes from one room location to another across building groups. Before they start to record routes, the application will ask the user about their personal feelings today (e.g. Are you hurry now? or Are you feeling tired now?), their special demands for the following route (e.g. Will you pass Tim Hortons on your way? or Do you need to use the bathroom on your way?) as well as some weather conditions (e.g. Is it sunny out side? or Is it snowing now?). Once the users finish the questionares, they will be presented an interface for them to record their routes. During the recording process, the application collects physical data of the route in the form of points on the floor map inputted by the user.

Our system will analyse the routes collected and the corresponding physical features of a particular route (e.g. the number of stairs, number of turns) with personal preferences such as physical requirement, personal feelings, and emotional options provided by the user. We will construct our model using the concept of decision tree. The model is trained by the collected data and will be able to predict the best route given a set of personal preferences.

Our final product aims to generate the proper routes upon request. Using this product, the user could specify two room locations, together with one or more personal preferences. Then, the system will run the model and return the most satisfying route. The system will display the route on the screen for the user.

In this paper, we describe the design of the courdsourcing routes collecting method, the feature analysing method and route generating system. We test the system with University of Waterloo campus building groups. We provide the test

results, the detailed evaluation of our system and the future work.

RELATED WORK

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REFERENCES

1. Howe, J. The rise of crowdsourcing. *Wired magazine 14*, 6 (2006), 1–4.