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ScienceDirect

Procedia Environmental Sciences 22 (2014) 257 – 269

Procedia Environmental Sciences

12th International Conference on Design and Decision Support Systems in Architecture and Urban Planning, DDSS 2014

Toward personalised and dynamic cultural routing: a three-level approach

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Abstract

This paper introduces the concept of "smart routing" as a recommender system for tourists that takes into account the dynamics of their personal user profiles. The concept relies on three levels of support: 1) programming the tour, i.e. selecting a set of relevant points of interests (POIs) to be included into the tour, 2) scheduling the tour, i.e. arranging the selected POIs into a sequence based on the cultural, recreational and situational value of each, and 3) determining the tour's travel route, i.e. generating a set of trips between the POIs that the tourist needs to perform in order to complete the tour. The "smart routing" approach intends to enhance the experience of tourists in a number of ways. The first advantage is the system's ability to reflect on the tourists' dynamic preferences, for which an understanding of the influence of a tourist's affective state and dynamic needs on the preferred activities is required. Next, it arranges the POIs together in a way that creates a storyline that the tourist will be interested to follow, which adds to the tour's cultural value. Finally, the POIs are connected by a chain of multimodal trips that the tourist will have to make, also in accordance with the tourist's preferences and dynamic needs. As a result, each tour can be personalised in a "smart" way, from the perspective of both the cultural and the overall experience of taking it. We present the building blocks of the "smart routing" concept in detail and describe the data categories involved. We also report on the current status of our activities with respect to the inclusion of a tourist's affective state and dynamic needs into the preference measurement phase, as well as discuss relevant practical concerns in this regard.

Peer-review under responsibility of the Eindhoven University of Technology, Faculty of the Built Environment, Urban Planning Group

Keywords: Affective computing, cultural tourism, route recommender systesm, tourist experience, user preferences

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Peer-review under responsibility of the Eindhoven University of Technology, Faculty of the Built Environment, Urban Planning Group
doi:10.1016/j.proenv.2014.11.025

1. Introduction

Offering suitable assistance to tourists during a trip is an important concern that has been in the limelight for many years, with early examples of Cyber-guide[1] and GUIDE[2]. Tour guides are meant to help tourists select relevant places and plan a trip around the selected ones accordingly – by means of using the information provided by and collected about the tourists, such as – to name a few – their demographics, interests and temporal constraints that have to be met. In other words, the tour guide considers what pieces of information would be relevant for the current case and, on the contrary, which ones from the available pieces should be omitted; hence, it performs information filtering[3]. In one subclass of information filtering systems – recommender systems for tourists[4] – available information streams are analysed based on a number of categories, e.g., details about the tourists themselves, the items they expressed to be interested in, and various context information that is considered to be relevant. With the help of one or more filtering techniques, a recommender system is able to determine which parts of the entire information pool are (likely to be) more relevant and more interesting to the requestor, thus providing, or "recommending", only certain specific information to certain users while leaving the rest of it out.

With the recent advancements in technology, the proliferation of the internet, and the adoption of mobile and pervasive computing[5] paradigms, recommender systems for tourists have also joined the world of mobile devices and have become available on the fly. A typical target user of such a recommender system is a tourist who is interested in exploring a (historical part of a) city and therefore would like to make a tour over this city or its part on a particular day. The tour involves visiting a number of points of interest (POI) – sites of specific interest to the tourist – that may be spatially dispersed across the city area implying that travelling may be involved in implementing the tour. A potential issue with these solutions is that they are often not detailed enough in the sense that they do not fully take into account a tourist's quickly changing individual context, which stretches beyond the tourist's demographics and whereabouts. Today's information era of big data and social media caused an explosion in the amount of information that can be collected about people and assets. On the one hand, this situation greatly increased the role users – and therefore, tourists – play in the definition of the requirements for the functionality and usability of a particular (mobile) touristic service, so that it will eventually meet the needs of a larger number of tourists. On the other hand, this amount opens up opportunities of exploiting the benefits of information diversity in order to allow touristic recommender systems to deliver yet more personalised and fine-tuned solutions[6,7], further enriching tourists' experience.

In this paper we describe a concept of a new tourist recommender system focused on cultural tours in a city. We suggest that the composition of such a personalised cultural tour can be achieved by offering tourists "smart routing" – a travel route recommendation tailored to their personal profiles that includes three levels: 1) programming the tour, i.e. selecting a number of relevant POIs to be visited, 2) scheduling the tour, i.e. arranging the selected POIs into a suitable and meaningful sequence, in order to increase the cultural value of the tour, and 3) determining the tour's travel route, i.e. identifying a set of trips between the POIs that the tourist needs to perform in order to complete the tour.

The "smart routing" approach intends to enhance tourists' experience in several ways. One concern in planning a trip and identifying its content and route under such conditions is to involve a comprehensive consideration of the multi-dimensional and often dynamic preferences of tourists; in particular, their needs and affects. Our approach relies on the analysis of the tourist's individual dynamic preferences and needs, with a subsequent understanding of the priorities and importance of each activity from a tourist's point of view at a particular moment. This aspect includes, as a separate category, learning about a tourist's emotional and motivational state, which allows the system to further fine-tune the details of each of the three levels. The system's ability to reflect on the tourists' dynamic preferences and needs rests on learning the following aspects:

- which dimensions of emotions and needs can be distinguished and are relevant for the experience;
- how activities influence preferences and states; and vice versa
- how affective states and preferences determine priorities of activities (and therefore, the content of the POI selection).