

MapTop: Behavior as Context in a Digital Exhibition Guide

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ABSTRACT

In this paper, we describe MapTop, a system working on a mobile device, developed to support the exploration of an exhibition. When using digital exhibition guides, one potential problem is that the guide system may become the focus of attention, interrupting the exploration experience. To avoid this problem, we used positioning of the mobile device as a way to infer the focus of attention and presented content information accordingly. The MapTop system is evaluated in a field trial and a user study and some of the lessons learned are discussed.

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General terms: Design, Human Factors, Experimentation

Keywords: Navigation, Map, Augmented reality, Mobile

INTRODUCTION

The support of navigation in places like museums and trade shows [1] is a promising application for mobile information devices such as PDAs. One requirement for digital exhibition guides is to avoid interrupting the users exploration experience by capturing and holding the user's attention. The MapTop digital exhibition guide is designed for subtle and intuitive interactions that require relatively little attention. To achieve this goal, we defined the context and the meaning of the explorers' behavior in relation to the positioning of the mobile device [2,3,4]. The novel aspect of this research relates to the semantics of device posture as it relates to the direction of the eye gaze, as an indicator of the user's interest.

STRATEGIES FOR EXPLORING THE EXHIBITION

Users exploring an exhibition, of which two are discussed here: 1) switching between global and local spatial cognition and 2) social navigation. We will now discuss how these strategies were incorporated into the design of the MapTop system.

Switching Between Global and Local Spatial Cognition

When exploring a new place, people will often use an exploration process where they first examine the global structure of the place, then plan the route, and then examine the details of local structure. Sometimes an explorer will alternate between global and local examinations. To support this behavior, MapTop provides seamless switching between the 2D map that represents the global structure of the space, and the 3D augmented-reality view that shows information about the surrounding area.

Social Navigation

When navigation takes place in an unfamiliar place (exhibitions are a typical case), people often follow the majority's decision to determine the right way to go. This strategy has been referred to as "Social Navigation". By calculating the number of visitors to each booth using RFID tags, we were able to incorporate social navigation strategy into MapTop.

Relying on the choices of others requires some similarity in preference. At the exhibition where we tested the MapTop system, visitors chose the keywords that they were interested in. We categorized the visitors into 4 groups based on the keywords that they chose.

DESIGN OF MAPTOP

MapTop is implemented on an ultra-small Windows PC (Sony VAIO type U). Figure 1 shows how MapTop looks. In the system, the space of interest is represented in 3D graphics. The strength of the interest of other visitors to each booth is shown as the size of a balloon. The location of the device is measured using the signal strength of wireless LAN and calculated using Cisco Systems Location Appliance. The orientation is measured using Honeywell Truepoint compass module.

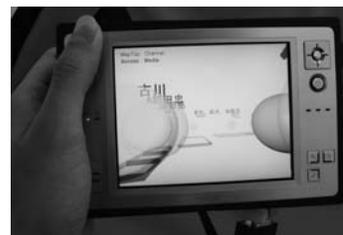


Figure 1:MapTop system

SWITCHING LOCAL AND GLOBAL INFORMATION

The position of the device relative to the direction of eye gaze provides contextual information about the user's interest. When one is looking around the physical space, it is natural to present the information relevant to the direction being looked at. But when the user is looking down towards the device she is holding, it doesn't help to show information about the floor.

While the orientation of the device is vertical, the viewpoint in the 3D graphics moves to match the actual site. When the orientation gets close to horizontal, the sight in the system zooms out and switches to a 2D map seamlessly (Figure 2). The orientation of the map follows the orientation of the device to maintain compatibility. The threshold of the angle to switch has a 30 degree margin of error in each direction to make the switching stable and prevent unnecessary cycling between the views.

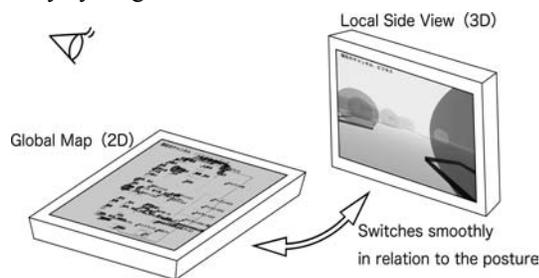


Figure 2: Switching local and global information

RECOMMENDATION STRENGTH IN MAPTOP

In MapTop, the number of the visitors that have specific interest is presented as the size of the balloons. The weight of the access count is separated to 4 categories, Media, Governance, Care, and Marginal. Categories are switched using the cursor key (Figure 3).

Category is switched by pressing the left/right key

Balloon size changes depending on the current category

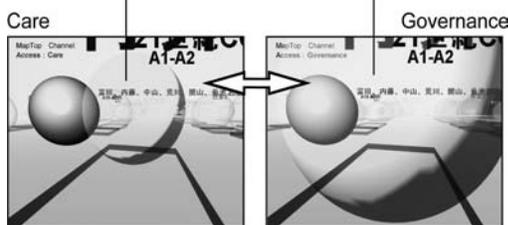


Figure 3: Category and recommendation

The visitors to the exhibition were given a passive RFID tag, identifiable by multiple services at the site. In addition, RFID readers were placed at each booth. Using this infrastructure, several services like the delivery of research information after the exhibition were offered. The visitors were encouraged to touch their tags to the reader at booth they were interested in.

As mentioned previously, visitors were categorized into 4 groups using the keywords they selected at the online registration. The weight of an individual visitor for each category was the total number of the keywords he chose that belonged to that category. A total of 50 keywords were used.

Then the correspondingly weighted touches (i.e., inputs for each booth) were calculated to rate the strength of the booth for each category.

OTHER CONTENT

There were two additional features that could be used. The first type was information about V.I.P.s that the visitor could locate. The second was a request for help which could be transmitted to an attendant.

USER STUDY

We carried out a user study at an open laboratory of Keio University's Shonan Fujisawa campus at Roppongi Hills(Tokyo) over a two-day period in November, 2005. Nine subjects (5 male and 4 female, aged between 17 and 26) used MapTop for navigating through the exhibition. After using the system, subjects answered a questionnaire. Eight of the participants responded that MapTop was useful in finding interesting booths, while six of the participants rated the recommendation information provided useful.

CONCLUSIONS

The MapTop system extends previous work on digital exhibition guides by explicitly assessing and handling focus of attention as a key parameter, and by incorporating social navigation functionality. Social navigation is facilitated through a recommendation system where user interests are mapped to the interests of booths or regions within the exhibit space. In our user study the result was shown to be effective to several study participants to provide useful information.

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