

Effectiveness of Mobile Recommender Systems for Tourist Destinations: A User Evaluation

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Abstract

Mobile recommender systems have the potential to substantially enrich tourist experiences. As their handling marks a big challenge for ordinary users, its acceptance can only be evaluated when utilized by the intended user group itself - real tourists. In a field trial in Görlitz (Germany), 421 tourists explored the city with one of two different mobile information systems, a proactive recommender of personalized tours and a pull service presenting context-based information on demand. A third group of tourists was tracked by GPS receivers during their exploration of the destination relying on traditional means of information. Results point out that both mobile applications gained a high level of acceptance by providing an experience very similar to a traditional guided tour. Compared to the group tracked by GPS loggers, tourists using a mobile information system discovered four times more sights and stayed at them twice as long.

Related work

Mobile tour guides are the result of years of research in the areas of recommenders, ambient intelligence and pervasive computing. Cyberguide [Abowd, 1997] was one of the first mobile tour guides. Personal preferences are not analyzed to compute a tour plan but the user can retrieve information or request a route to a desired Point of Interest (PoI).

GUIDE [Cheverst, 2000] is a mobile tour guide very similar to the hereby presented Dynamic Tour Guide (DTG) [Kramer, 2005]. The visitor chooses attractions from various categories. These attractions are then sequenced taking into account the opening hours, best time to visit and the distance between attractions. The sequence can be modified manually. Navigation is achieved by a map with a list of instructions. Differences to the DTG are the use of cell based positioning instead of GPS and the

selection of concrete sights instead of deriving the selection from generic preferences.

The CrumpeT project [Schmidt-Belz, 2003] is one of the few projects having performed a usability evaluation for its personalized, location aware multi-agent system, which recommends tourist attractions and provides interactive maps and directions to find a selected sight. Users had to complete several tasks observed by a research assistant. The majority recognized the system as added value to conventional information sources.

Examples for user studies on spatial behaviour without human observation are the path analysis of shoppers in a supermarket with RFID tags located on their shopping carts by Larson et al. [2005] and an analysis of visited locations within a city via GPS by Ashbrook et al. [2003].

Field trial design

The main focus of the field trial was to evaluate the usage of two mobile applications by real tourists, clarifying the questions if and how long tourists really use mobile information systems and if it has any effect on their behavior when exploring a destination.

Three groups were compared – two using a mobile information system (DTG Planner or Explorer) and a control group carrying GPS loggers to record their movements. For each group 10 available devices (MDA III with external GPS receivers configured as Planner or Explorer and standalone GPS loggers) were daily distributed to tourists in August 2006.

An instrumentation framework logged the interactions of tourists using both mobile applications. This generic framework takes screenshots of each dialog, stores click and scroll events and records user entries.

Explorer Mode

The DTG Explorer is a pull-based information system showing a map with the current position of the tourist as well as a constantly updated list of sights within a distance

of 100 metres. Selecting an item from this list or entering and staying inside a predefined activity area for more than 10 seconds triggers information presentation. Leaving the sight or manually changing to the map will stop the presentation. The Explorer mode tries to support the traditional way of self-guided sightseeing using a city map to identify, select and navigate towards attractions in the vicinity.

Planner Mode

The DTG Planner tries to emulate a personal tour guide. Therefore it elicits personal generic preferences to rank all available attractions. Furthermore tour constraints like duration, start- and endpoint have to be specified. Performing the proposed tour plan, the tourist receives audible navigation instructions by an integrated standard navigation package which also displays a map with the suggested route. When reaching a planned sight information presentation starts automatically.

Results

A total of 421 tourists participated in the field trial, counting 142 Explorer users with a median age of 50 years, 137 Planner users with a median age of 48 years and 142 tourists who took the GPS logger aged 54 years at median. Only less than one fourth complained about difficulties regarding the handling of the device, which is remarkable considering their age.

The following table compares the tours for all three methods considering different criteria:

| Criteria | Planner | Explorer | Logger |
|-------------------|---------|----------|--------|
| Distance | 3.4 km | 4.4 km | 6.6 km |
| Duration | 1.3 h | 1.7 h | 4 h |
| Visited sights | 14 | 16 | 4 |
| Visit time (mode) | 4 min | 4 min | 2 min |

Both mobile applications are fundamentally different in their support of tourist behaviour, nonetheless the duration of use are very similar and match those of traditional guided tours. This might be due to the fact that the mobile applications were called "Tour Guide" and therefore used as such or that the 1.5 hour format suits fundamental human requirements about a sightseeing tour. The GPS loggers were used far longer with a median of 4 hours. Thus they captured data beyond the sightseeing tour and may include segments with other possible activities like eating, shopping, visiting hotel, relaxing or visiting a museum.

Both mobile information systems use geo-referenced areas for each single sight in order to trigger information presentation and to recognize visits at each modelled sight. A visit was defined as a single stay in a hot area for longer than 40 seconds. Results show that mobile recommenders enable a tourist to see 4 times more attractions in about 1.5 hours than he/she would be able to enjoy in 4 hours without such an application. From the perspective of

destination management a mobile information system makes the destination look 4 times richer and diverse.

Explorer and Planner provide equal staying times at sights with a mode of 4 minutes. This is pretty close to the duration of the multi-media presentation available for each sight. In contrast, the mode value for the Logger group is only 2 minutes. Potentially they pass by many sights or only stay for few seconds without recognizing them as such. Görlitz offers many places connected to a saga. Without information systems individuals will never hear about the story when being there. This indicates that targeted interpretive information motivates the tourists to stay at each sight twice as long.

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