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Peer-reviewed author version

Traunmueller, Martin; Schieck, Ava Fatah gen; SCHOENING, Johannes & Brumby, Duncan P. (2013) The Path is the Reward: Considering Social Networks to Contribute to the Pleasure of Urban Strolling. In: Proceedings of CHI'13 Extended Abstracts: ACM SIGCHI Conference on Human Factors in Computing Systems.

DOI: 10.1145/2468356.2468520
Handle: http://hdl.handle.net/1942/14609

The Path is the Reward: Considering Social Networks to Contribute to the Pleasure of Urban Strolling

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CHI 2013 Extended Abstracts, April 27–May 2, 2013, Paris, France.
ACM 978-1-4503-1952-2/13/04.

Abstract
Most (mobile) online map services focus on providing their users the most efficient route to their target location. In this paper we investigate the relationship between the physical and digital urban navigation to improve wayfinding for pedestrians by enhancing their experiences when strolling through a city. With our application "Space Recommender System" we describe a new wayfinding approach by implementing common digital online methods of commenting and recommender systems into the physical world, using voting data from social network services. Initial findings highlight the general importance of the walking experience to the public and suggest that implementing social media based recommendations in route finding algorithms enhance the pleasure of urban strolling. The initial user tests of the system in a real world context together with collected feedback and the observations throughout the design process stimulate the discussions of wider issues and highlight its potential for future novel wayfinding applications.

Author Keywords
Wayfinding; Urban Pedestrian Navigation; Social Networks; Voting data; Mobile Devices; Recommendation Systems;

ACM Classification Keywords
H.5.1 INFORMATION INTERFACES AND PRESENTATION (e.g., HCI): Hypertext navigation and maps

Introduction

Typical online map services, such as Google Maps, Tom Tom and others, were designed to deliver the most time, distance and fuel efficient route from point A to point B to car drivers. They have been extended to provide route description to pedestrians and cyclists using similar algorithmic approaches. Therefore common pedestrian wayfinder systems amplify the pedestrian's target orientated movement known from architectural theories [11]. These circumstances constitute a problem when it comes to the walking experience itself. Tourists, visitors or inhabitants of cities like Paris, London or Vienna are often looking for a flaneur-esque [1] experience (urban strolling) – they want to soak up the city and see hidden sights that are unique to the city that they are visiting. The question naturally arises how technology can be designed to better support this kind of urban exploration. Standard services give little attention to the walk itself. The location, landmarks and surrounding are often not included in the route description. The user follows the generated path not knowing what he or she might be missing out on the way. The walk gets degraded to a spatial necessity.

In recent years social networks have incorporated various location-based tools. For instance users can easily share their current location [6] along with their opinion about near-by venues by using voting and commenting systems. This leads to the creation of a rich data set of geo-located user choices and crowd feedback sprawling over the cityscape.

In order to animate people for more walking within the urban landscape, we investigate if and how this data can be translated into the urban space to contribute to the walking experience. The investigations rely on the development of a wayfinder application – the Space Recommender System (SRS) – for the metropolitan area of London (and other similar urban environments that often have hidden back paths off the main roads). These hidden routes are often taken by locals, but not by visitors. In contrast it is the visitor who is most likely to use standard mobile navigation devices (smartphones and tablets) to plan their route when exploring the city. Hence there is an opportunity for systems to be developed to support the idea of urban exploration informed by local knowledge through the use of social media sources.

Related Work

Mobile pedestrian navigation systems have been studied a lot within the (mobile) HCI community [5]. Various researchers have also explored how route descriptions can be enhanced for pedestrians and tourists. Raubal and Winter [8] have investigated how to enrich wayfinding instructions with local landmarks to support navigation at decision points. More recently Schöning combined with WikiEar [9] a routing service with a tourist guide system. This system automatically generated audio tours by playing snippets of Wikipedia articles relevant to the user's location. With GetLostBot [2,3] Kirman suggests a tool to break out of static movement patterns. GetLostBot in addition to Foursquare (https://foursquare.com/) reads the users check-in patterns and, when detecting a routine, suggests near-by serendipitous places. This attempt to design for serendipitous discover is a very exciting innovation in urban exploration. However, users of

GetLostBot showed limited willingness to follow the suggestions generated by the system.

Serendipitor (http://serendipitor.net/) is another system that generates random paths between two defined points, and adds tasks designed by celebrates for the user to complete along the way. The aim of this application is to “help you (to) find something by looking for something else” as mentioned on the website. However, the underlying concept of this system is that of a game rather than a routing system, focusing on the tasks the user is animated to do rather than the directions themselves.

As further example, Walkit.com (http://walkit.com/) is a website that incorporates air pollution data into the route finding process. By doing so this system tends to generate routes through parks, by rivers/canals or quieter streets, rather than following busy routes as this minimizes the overall exposure to air pollution. A limitation of the system is that it does not gather real time data but depends on historical records. This means that it cannot guarantee to generate the route with the lowest pollution at any time. After having tested the application and compared the route with live air quality data (http://londonair.org.uk/) the results were quite diverse. The lack of real-time data makes the interesting idea too static and not highly efficient for its purposes.

As described above various researchers seek to improve pedestrian wayfinding instructions in various ways. What is novel in our work is the strong integration and usage of existing data from virtual communities. Online social networks open up new opportunities for further research within that field. To our knowledge our work is novel in engaging pedestrians with their environment by using crowd sourced feedback of facilities around them. Using Facebook’s ‘Like’ data our research refers to the idea to incorporate social data in recommendation models [10]. It explores the combination of methods known from digital media (such as recommender, comment and voting systems) social media and a pedestrian navigation system in order to develop a new methodology for urban pedestrian navigation based on pleasure rather than transfer time. Our prototype SRS provides a good tradeoff between random routes (such as Serendipitor) and pedestrian navigation services that are trimmed to be efficient.

Pre-Questionnaire to Inform the Development of the SRS system

To design a SRS it is crucial to know the general behavior towards recommendations of the crowd. The translation into the urban space requires an investigation of the walking behavioral background. Thirty questionnaires with 7 questions regarding the general usage of smartphones and general behavior towards recommendations and strolling were handed out to random volunteers on the street near UCL in London (UK). Participants were aged from 20 to 40 years, 60% male. All of the participants were familiar with the use of mobile and desktop based map and navigation systems and almost half use such tools more than twice a week. Most of the participants (66%) frequently enjoyed strolling in their free time or on vacations. Most participants also agreed to take a longer detour into account to be able to walk along a pleasant route. Furthermore the findings show that 33% of the participants frequently tend to visit recommended places from online communities in a

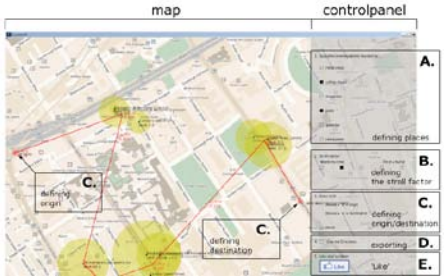

Figure 1. Overview: Space Recommender System Interface

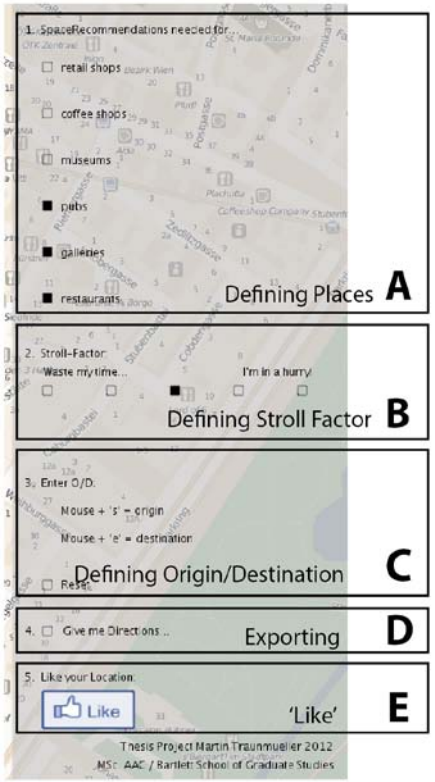

Figure 2. Detail: Control Panel

familiar surrounding and even 66% of the participants in unknown areas, as on vacation.

From this pre-questionnaire we concluded that,

- the participants saw a great potential of urban strolling and agreed on the general importance towards gaining pleasure while walking avoiding main roads and exploring interesting sights;

- the participants agreed that social networks are often one of the main recommendation sources for locations;

- the participants would take a longer detour into account to be able to walk along a pleasant route.

Space Recommender System

Based on the findings of the pre-questionnaire, we have developed a desktop prototype using Processing (http://processing.org/). The user interface shows a map for mouse interaction (Fig. 1). On the right side of the screen the interactive UI components are located (Fig.2). We describe each of these components below:

A. The user can choose which types of places she is interested in visiting on her route. The selection includes: retail shops, coffee shops, museums, pubs, galleries and restaurants. Multiple choices are possible.

B. Depending on the user's walking time and distance of detour he wants to take, he can make the route longer or shorter by changing the number of route points. The number of waypoints is directly related to the output dataset of a Kohonen Network [4] - a self organizing map - and defines the degree of route-detailing.

C. As the current prototype is browser based it does not support geo-location tracking yet. The user needs to pan and zoom the map to his current geographical location. A user can select a start and endpoint by simply clicking the map. The SRS sets markers on to the two locations and the route is generated.

D. After coming to a halt without any further adjustment of the Kohonen Network [4], the generated waypoint coordinates are automatically exported to Google Maps that generates the shortest routes between the defined waypoints. Combined the route segments define the user's final route recommended by our system.

E. The generated route defines in that stage paths leading from one recommended area of interest to the next, relating to facilities like shops and pubs. On or after the walk, the user can also feed information back into the SRS. For example a person enjoys a view from a specific spot or remembers the first kiss at a certain location while walking along, he/she can share this impression which feeds the information right back into the system. The route description is then dynamically updated. A video presenting the functionality of the SRS can be found online at http://vimeo.com/54149010

Initial Evaluation

Thirty participants were asked to walk twice from a location to a defined destination using two different routes during three overcast working days in summer 2012. Route A was generated from our SRS (Fig. 4), whereas route B was suggested by Google Maps (Fig.5) pedestrian routing service. We used the area around UCL / London St. Pancras because it offers a genuine

Figure 3. SRS Output showing Origin / Destination point, Places of Interest (the size of the yellow markers represents the number of Likes) and the generated path (blue coloured)

Figure 4. Route Option A – by SRS

Figure 5. Route Option B – by Google Maps

urban setting and ideal urban layout conditions for the testing.

Route A and route B were counterbalanced. After having finished both walks, the participants were asked to fill out a questionnaire to compare the two routes according to their personal experience. Questions relate to their general route preferences and their opinion about using the routes generated by the SRS every day.

Results

When walking along the testing directions, route A (generated by SRS) was sensed and described by 23 participants as exciting. More than half of the participants found route B boring with only one participant who was excited about it. Route B was also experienced by the majority of the participants as monotone. Route A instead was highly appreciated by the participants – a third found it 'very diverse' and almost half of the participants still 'diverse'. More than half experienced route A as calm, whereas route B was sensed as stressful and noise. In terms of pleasure more than 75% of participants were very 'highly pleased' with the walk on route A. Route B only can earn points in terms of distance and time efficiency, whereas 48% of the participants were 'pleased' and 42% being 'very pleased'. Nevertheless, 83% of participants think that the detour was worth doing route A, only 17% of users tend to see the longer route as a waste of time.

Discussion and Future Work

The initial user evaluation show that there is potential to change common algorithmic routing approaches of mobile pedestrian routing services in order to make pedestrian routes more enjoyable for the user. Using open-source online voting data from social network services as input we can open up possibilities to generate new experiences while walking through the cityscape, based on pleasure rather than on transfer time. Our methodology can act as animator for people's walking behavior. It suggests a shift in human approach towards urban strolling: focus has been shifted from the destination towards the walking experience as a whole. In other words the path becomes the reward. The SRS achieves this by leading the user via concentrated areas of places that have been recommended by publicly available crowd-sourced data.

While positive results (79% of the participants were favoring the route recommended by the SRS) support the idea of such an approach, there are some unanswered questions that keep space for further research. As mentioned in the introduction, visitors to a city often enjoy stepping into the role of a flaneur, where the serendipitous experience becomes a key role [1]. One can question how far our approach supports this idea by suggesting a route leading into dense areas of places of interest. Related projects [2, 3] point out the importance of understanding peoples behavior towards serendipity. With the aim to engage people with the walking experience the project picks up on those findings and leaves enough space for a serendipitous experience but includes space and time properties, leaving the user not completely in the dark.

To better understand these problems we want to further improve our SRS prototype. One limitation of the system is that it ran on a desktop to allow for ease of prototyping the general idea. While this is an obvious

limitation we plan to develop a version of SRS that runs on mobile devices. In addition we want to further improve the route recommendations. The current prototype takes general 'Like' data as input. Recommendations are highly individual and differentiate from person to person therefore it is crucial to make this procedure more precise in terms of filtering. Taking the data of someone's friends might result in a more taylor-made outcome, but contains at the same time the risk of navigating through a "Filter Bubble" [7].

The relationship from the user's importance of visiting recommended places to their actual distance from the shortest route is another item for our future work. For further development it is highly important to understand how physical distance changes the perception of the digital space and vice versa, how digital space can change behavior in that sense.

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