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Intermodal personalized Travel Assistance and Routing Interface

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Abstract

An increasing amount of available data sources and intermodal travelling pose a challenge for the design of mobility apps. This paper examines the concept of an interface for intermodal personalized travel assistance and routing. The analysis of two central use cases *intermodal routing* and *personalization* revealed pitfalls and gaps for the design of mobility apps.

1 Introduction

The market of mobility applications underwent a strong growth over the last years. Besides the well-known transit solution by Google (Ferris et al. 2010), more and more app-based mobility services emerge (Weissman & Villalobos 2012). Standard functionalities include stating departure/arrival time, origin, and destination, finding the nearest transport stations, computing the shortest way between them and giving information about departure times, connections, lines involved and total travel time. In addition to this basic feature, each app usually offers some unique feature like e.g. augmented reality (Borgia et al. 2012), real-time information on the quality of service or route planning between special points of interests (Inglesant & Sasse 2007). At the same time, especially for big cities, an increasing amount of data sources is getting available. This includes static data like public transport routes as well as dynamic data like real-time information about weather and road traffic (Leitsch 2002). Future mobility apps will offer situation-related routing proposals by incorporating various kinds of data as well as combinations of transportation modes. The intermodal trip planner of the MOLECULES project e.g. calculates routes considering electro mobility and public transportation (Belinchón Rubio 2014). The number of available data sources together with the possibilities of intermodal transportation result in a large number of options regarding the personalization of routing requests. This development poses a challenge for the design of mobile applications, as the complexity of interfaces usually increases with the number of options. In this paper we reflect a concept of a mobility app supporting citizens in finding environment friendly routes. As a basic principle within the app, gamification will be integrated in a way that users can earn “green leaves” for choosing “green” connections.

Following a user centred approach, we discuss two central use cases, namely *multimodal routing* and *personalization*, and deduce implications for system and interface design.

2 Use Case Analysis

The use cases are depicted with the help of a functional mock-up (Figure 1). “Functional” means that the illustrated functionalities are supposed to be integrated into a GUI. Further interface and interaction design works will be carried out in a later development process.

Figure 1: mock-up screens from left to right: (1) basic routing information, (2) personalization by options and routing preferences, (3) routing results, (4) navigation details for the selected result.

2.1 Intermodal Routing

Use case: A citizen is using the mobility app for planning a trip. Routing proposals are calculated and listed with the app. Amongst others, the app is offering an intermodal route comprising bike and public transportation. Both, an acceptable travel time at this particular time of the day, and the chance to be rewarded with “green leave” credits for choosing an environmentally friendly option convince the user to go for the intermodal option.

Implications: The basic routing information for intermodal routes on screen 1 does not differ substantially from common routing interfaces. The horizontal radio buttons, *fastest/shortest/ greenest*, allow the user for the prioritisation of routing proposals. The actual purpose of green mobility is taken into account by including an option for green routes. Last connections are displayed in a favourites list. The routing results are presented on screen 3. The intermodal route within the red routing proposal is clearly distinguishable as the different traffic modes are listed. The system provides information about CO_2 emissions and earnable points for "green" routes. Screen 4 shows details regarding traffic modes and the gamification information.

2.2 Personalization

Use case: A citizen is using the mobility app for planning a trip. Having access to the user profile, the App is proposing to take a public transport connection. The App is taking into account actual and forecasted weather and traffic situation. As rain is forecasted and the traffic situation between origin and destination is bad due to various construction sites and a heavy traffic load, modes "bike" and "car" were disregarded.

Implications: Personalization options are shown on screen 2. At the top of the screen a means to save profiles is integrated. For the *fastest/shortest/greenest* option a default can be set. Considering the integration of real-time data, options to *avoid bad weather* and *avoid heavy traffic* can be checked. The inclusion of traffic modes can be configured. At the end of the screen a means to order the priority of routing proposals is included.

3 Discussion

Intermodal routing only marginally affects the elements within the GUI. The task of gathering fundamental routing information is basically the same as for classical routing. However intermodal routing has to be particularly considered, if routing proposals and proposal details are displayed. Consequences for the GUI can arise, if the modal split within the proposed routes is high. If the number of transport modalities increases, the presentation of routing proposals within a list may have to be adapted in such a way that the information is still easy to process for a user. The gamification aspect of the mock-up only slightly affects the GUI so far. Displaying "green leaves" in the upper right corner of a routing proposal logically separates the gamification information from the routing data. On the proposal details screen "green leaves" are displayed as the last item within a list of detail information. When further developing the interface design, the way of presenting this information should be rethought, to optimally fit the users needs. Personalisation must provide means to store information about the users personal travel preferences, common start and end locations and information related to the usage of the app, including gamification behaviour. It has to be determined, which exact information has to be used and stored. It is also to be determined, whether the users profile information, including personalization options, will reside locally on the user's device, or centrally, on a server. However, processing requirements may call for at least a local copy. Data protection requirements also have to be examined, to find a viable solution. The profile data is the basis for the user adaptive intermodal routing. As can be seen, some of the personal preferences like *avoiding bad weather* require the inclusion of external services in the process of personalizing a route for the user. The data collected from the user's interactions, should be stored in a user history. This history can be used to create suggestions, increase the quality of the routing, and to advise users about their CO_2 footprint. Intermodal travelling and data sources produce more options for the user. Depending on the number of options, reconstruction of the personalization screen should be taken into account.

If more options have to be integrated, users could lose the track of the GUI. Limiting the number of options may be able by focusing on a specific user group or purpose of the app.

4 Conclusion and Future Work

The aim of this paper was to examine the concept of an interface for intermodal personalized travel assistance and routing. By analysing two central use cases, *intermodal routing* and *personalization*, pitfalls and gaps of the actual concept were revealed. Regarding the GUI design, valuable solutions for the presentation of the modal split within a routing proposal have to be found. We expect that a logical separation of functions related to utility and gamification functions improve the usability of an application. With respect to an increasing number of personalization options, resulting from available data sources and intermodal travelling, we recommend to focus on specific user groups or app purpose. Future work of this project will include interface and interaction design, development of a gamification concept, integration of speech interaction and system evaluation.

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