

Adaptive Interfaces for Mobile Preference-Based Searching

Work-in-Progress Paper

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Abstract—Advanced mobile computing devices are becoming more powerful and available to the public at affordable prices. These mobile devices are ideal for searching for and identifying points-of-interest (POIs). Graphical User Interfaces (GUIs) are becoming increasingly complex as applications continue to add more features and advanced functionality. Adaptive interfaces have been proposed to address this issue. The objectives of this paper are to identify potential benefits of adaptive interfaces and investigate how they can be used to support mobile preference-based searching.

Index Terms—Adaptive Interfaces; Human computer interaction; Mobile Tourism; Preference-based searching.

I. INTRODUCTION

Mobile Preference-Based Search Tools (PBSTs) allow users to identify POIs most suited to their needs and constraints using a mobile device. Mobile devices, however, have several design constraints, including limited screen space. Adaptive interfaces possess several benefits and advantages over static (traditional) interfaces, which do not take a user's preferences, skill set and experience into account [1]. Little research has been conducted on identifying the potential benefits of adaptive user interfaces for mobile preference-based searching. The objective of this paper is thus to investigate how adaptive user interfaces can be used to support mobile preference-based searching.

Section II of this paper discusses related work. An existing mobile PBST is discussed in Section III. Section IV discusses adaptive interfaces while Section V discusses the requirements analysis for an adaptive mobile PBST. Conclusions and future work are discussed in Section VI.

II. RELATED WORK

A. Preference-based Searching Techniques

Preference-based searching is defined as an interactive process that helps users identify the most preferred option (also known as the target option), based on a set of explicitly

stated preferences [2]. Users are not forced to specify all the search criteria before viewing a set of results and can specify their criteria (using dynamic query controls) in any order. A PBST is able to display partially satisfied results (Figure 1), therefore allowing a user to view incremental changes to a set of search criteria [3].



Figure 1: A coloured vertical bar represents the extent to which a POI satisfies the user's query [3].

B. Visualisation Techniques

The most common technique to display search results is using a ranked list called a List View Display (LVD) [3]. LVDs are beneficial in that they can be sorted according to various attributes such as category, distance to a certain location or alphabetically.

Alternatively, search results can be visualised using a Map View Display (MVD) [3], which visualises POI search results using a map (Figure 1).

III. POINTER

A system called "POInter" was developed in 2007 as part of an Honours Treatise at the Computer Science & Information Systems (CS&IS) department at the Nelson Mandela Metropolitan University [4]. POInter allows a user to search for POIs in different categories such as Accommodation and Restaurants and view the results using a MVD.

POInter demonstrated that preference-based searching could be used as an effective search tool to support mobile tourism. POInter addressed several usability issues in existing systems [3] by providing simple checkboxes with which to specify criteria (Figure 2). A technique known as the "Halo Visualisation Technique" [5] was used to effectively visualise the location of off-screen POIs (Figure 2).



Figure 2: Specifying Accommodation classification criteria (left) and viewing search results (right) in POInter [4].

IV. ADAPTIVE INTERFACES

A. Potential Benefits

Several authors have demonstrated that dynamic interfaces are preferred to static interfaces [1]. Adapting GUIs for mobile computing is a difficult issue as the design is constrained to the capabilities of the mobile device.

An adaptive user interface can look at the current task, understand it, recognise the user's intent and automatically take over the task completely or partially, allowing the user to focus on other more important activities [1; 6].

The information overflow associated with finding information in complex systems or large databases can be reduced through the use of adaptive interfaces. Irrelevant information can be filtered out, therefore reducing the user's cognitive load. Content filtering and delivery are enabled via assumptions made about user behaviour after analysing patterns discovered through implicit data gathering [1]. Tasks are made easier by modifying the communication style, content and form of information that is displayed [6].

B. Techniques

System adaptations can be classified into three different categories [7]. The *data* (content or information) can be adapted to suit the user's activities and context of use. Based upon the user's activities, context of use and explicit customisation, the system can adapt the *user interface* or interaction design. *Visualisation* adaptation is concerned with how the information will be presented to the user. For example, a map's scale or zoom level could be automatically adjusted and the amount of POIs filtered based upon how fast the user was travelling.

V. REQUIREMENTS ANALYSIS

Using an iterative design and evaluation process, an adaptive mobile PBST will be developed to support preference-based searching. POInter [4] will be used as a basis for initial implementation of the new adaptive system.

A highly flexible and iterative development approach will be used to complete the implementation, which will include informal user testing and a field study to determine the level of adaptation required. Limitations of existing mobile PBSTs will also be taken into consideration during design.

VI. CONCLUSIONS AND FUTURE WORK

This paper identified potential benefits of adaptive interfaces and discussed how these could be used to support mobile preference-based searching.

The next stage of this research entails developing an adaptive interface to support mobile preference-based searching. A field study will be conducted to establish the requirements for the adaptive mobile PBST. Analysis of the quantitative and qualitative data collected from the field study, combined with the literature study, will allow the potential benefits of an adaptive mobile PBST to be determined.

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