Ubiquitous Personalisation at Interactive Surfaces

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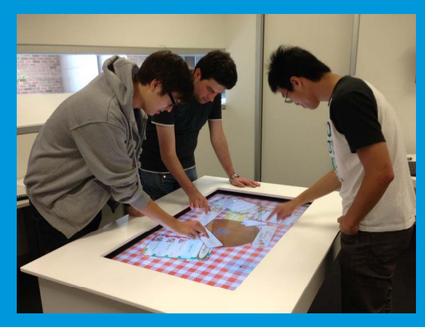

INTRODUCTION

Motivation

Personalisation is the process of providing information that is tailored to a person's interests and preferences. The motivation for personalisation comes from being able to provide support to users when carrying out certain tasks, such as retrieving information. The application of personalisation to interactive surfaces may provide a way of enhancing the experience of users who interact together.

Challenges

1. Security and privacy

   Since personal information is required for personalisation, maintaining the security and privacy of this information is paramount.

2. Enabling user control and scrutiny

   Users should be able to both control and examine how their personal information is used in the process of personalisation.

3. Multi-user personalisation

   Interactive surfaces provide a medium for collaborative tasks among groups, so enabling personalisation for groups of users needs to be addressed.

APPROACH

Our solution involves presenting an interface that is personalised for users at an interactive tabletop.

User Model

A key component required for personalisation is the *user model*, which is a profile of the user's personal information, such as their interests and preferences.

The user model is stored on the user's personal device, such as a smart phone, which allows them to maintain control of their own information. The user is able to wirelessly connect their device to an interactive tabletop, which will then use their user model to personalise the interface (Figure 2).

MyMenu Application

MyMenu is a tabletop application that demonstrates how restaurant menus may be personalised (Figure 1). Users are able to view a menu that recommends items for them.

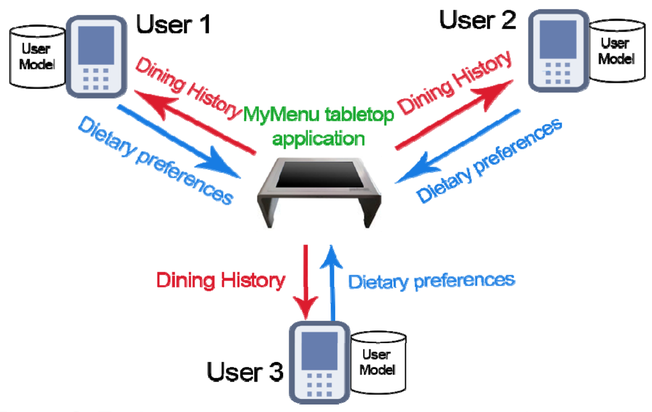

Figure 2: Each user has a user model stored on their mobile device. With the necessary permissions, the tabletop application may access the dietary information it needs to personalise the menu. Information, such as the user's dining history, may also be written to the user model..

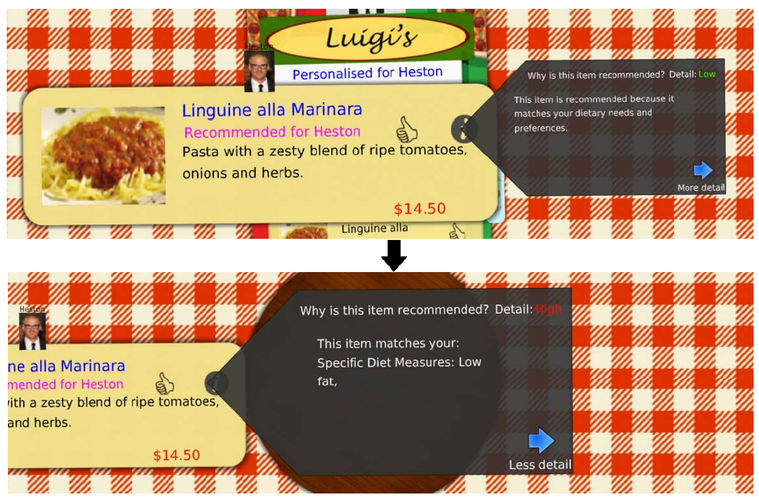

Figure 3: A recommended menu item for the user. The user is able to examine the reasoning for the recommendation by pressing the inspection button, which reveals the information from the user model that was used in making the recommendation.

Additionally, in addressing the issue of scrutiny, users may find out why items were recommended for them with different levels of detail that progressively reveal more information (Figure 3).

The circular "lazy Susan" in the centre of the interface (Figure 2) also provides a way of recommending to groups as part of our approach to multi-user personalisation.

EVALUATION

Goals of the evaluation included assessing the effectiveness of the MyMenu application in providing a personalised interface for users, particularly in allowing users to examine how their user model was being used. The personalised interface for the group was also evaluated for its effectiveness.

A user study was conducted as part of the evidence gathering process, where nine groups of three users were asked to complete a series of tasks.

Results

The participants' ages ranged from 18 – 61, with a mean age of 26. There were 19 students of varying disciplines (IT, physiotherapy, economics, microbiology), 3 sales associates, 2 architects, a designer and a bookkeeper.

Table 1: Performance on tasks for the three participants of each group (1-9).

	1	2	3	4	5	6	7	8	9
Personalise menu	● ● ●	● ✓ ✓	✓ ✓ ✓	✓ ● ●	✓ ✓ ✓	● ✓ ●	● ● ✓	● ✓ ●	● ✓ ✓
Find reason for recommendation	✓ ✓ ●	✓ ✓ ●	● ✓ ●	✓ ● ✓	● ● ●	✓ ✓ ✓	● ● ●	● ✓ ●	● ● ✓

Legend: ✓ = Success ● = Success after making error

Table 2: Likert scale (1 = strongly disagree, 7 = strongly agree) responses from all participants on understanding the personalised interface.

	Understood menu personalisation	Understood reasoning levels
Median	6	6
Std Dev.	0.527	0.707

Table 3: Usage of group menu during a collaborative task

	Number of groups
Used group menu	7
Did not use group menu	2

From the task performance results, most groups had at least one participant who completed the task without error. Other participants were able to learn from the actions of those who mastered the interface more quickly. User comments also indicated a positive take on the interface – "once you got used to it, there would probably be no complications" – suggesting a good degree of learnability.

Users were also questioned on their understanding of the personalisation process. They were asked how well they understood:

- Their menu being personalised using information from their user model.
- The different levels of detail in the reasoning for recommendations.

There was general agreement that users could easily understand the personalisation process with respect to how their personal information was used (Table 2).

Figure 1: The MyMenu application showing personalised menus as well as the circular group menu, which is personalised for all members at the tabletop.

It was also observed that almost all groups utilised the group menu in carrying out a collaborative task (Table 3), suggesting that the personalised interface was effective for groups of users.

CONTRIBUTIONS

The contribution of this work includes the definition of a conceptual framework that:

1. Enables effective personalisation at interactive surfaces for both individuals and groups of users.
2. Provides users with the ability to control and scrutinise how their personal information is used in interactive surface applications.

This work also provides a foundation for further exploration of personalisation at interactive surfaces, especially with respect to how the personalisation process is initiated.