A Personalized Recipe Advice System to Promote Healthful Choices

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ABSTRACT
We present a prototype of a personalized recipe advice system, which facilitates its users to make health-aware meal choices based on past selections. To stimulate the adaptation of a healthier lifestyle, a goal setting mechanism is applied in combination with personalized recipe suggestions.

Author Keywords
Recipes, user centered design, recommendation, goal setting.

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION
In [3], a recipe advice system (RAS) is presented that targets common barriers (i.e. lack of time and inspiration as well as planning and cooking skills) to promote healthful meal choices. The RAS targets users who have a basic motivation to change their eating pattern, but have difficulties to implement these intentions into their daily meal choices. The system provides the user with an easy-to-experience recipe browser and cooking guide. It provides a meal planning functionality and utilizes a simple decision support in form of easy-to-understand color coding that represents the nutritional values for each recipe (viz. Figure 1). The main focus of RAS is on the selection of suitable recipes for future meals, while no feedback on past choices is given yet.

With an increasing amount of knowledge available to generate personalized suggestions for recipes (e.g. [2]), we now address the question how to design a user interface that assists the user to select both palatable and healthful meals and also provides insights into past meal choices. In order to create a meaningful concept, we apply a user-centered approach to design such a personalized RAS.

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Figure 1 - Health indicators for two meals.

INITIAL INTERVIEW STUDY
To generate a qualitative overview of the user’s needs and requirements for a personalized RAS, an in-depth user interview study has been conducted. We presented six screenshots of potential functionalities, based on existing solutions that aim to create awareness of a user’s past choices (e.g. a day-to-day overview of meal selections, an overview of the nutrients in past meals and meal classification based on the food pyramid). In total, 4 females participated in this study. These participants were selected as they were all involved in an earlier at-home study around the RAS [3]. Each participant was the main responsible person for preparing dinner in their household.

The study showed that the participants favor an interface that assists them to get more inspiration to select an evening meal. Participants also appreciated an overview of past food choices, which might be presented by means of a calendar. Preferably, the user should be able to add more information (i.e. other ingredients that make the dish spicier, guests present during the dinner) or use the calendar for meal planning purposes. The health overview scenarios were received less positively, as these scenarios lacked actionable advice [1]. When a health indication function was presented, all the participants would like to see this combined with a more practical function that allows planning or selecting of meals. Especially the combination of calendar and health indicator was seen of added value. According to the participants, the application should encourage to eat and prepare healthy meals and provide insight to their food intake. Important requirements are that the application is not too time consuming and enjoyable to use.

The interviews revealed two main themes: on the one hand, a practical functionality that gives inspiration for future
choices, and on the other hand, means to provide feedback on health aspects. In conclusion, a promising UI helps users to track and improve the healthfulness of their meal selections, by providing suggestions for attractive, individual targeted recipes. Moreover, these functionalities could even be strengthened if practical features like recipe ratings and favorites were included.

CONCEPT DEVELOPMENT
A brainstorm session generated approximately twelve different ideas for possible interfaces for a personalized RAS. After clustering the ideas, three concepts were created.

The first concept is based on a basic level of information. Users are presented with an overview of what they ate in the past week. Based on this information, recipe suggestions are presented to the user [2]. The application, using Locke’s goal setting mechanism [4], selects these recipes based on personal preferences, the selected health goal and the current health average. Depending on how ‘healthy’ the past and scheduled recipes are, a visualization of that week’s health score is given. In the second concept, users receive an indication of their intake of different nutrients and can specify the RAS to focus on personally chosen guidelines (e.g. fibers or vitamin A). Based on the selected recipes, the specified nutritional information is combined and visualized. Moreover, current intake nutrient levels are compared with the recommended ones. The focus in the third concept is more directed on giving users advice on how to improve their eating behavior. Based on past meal choices, the user is presented with an overview of the recipes which are prepared most frequently. When selecting one of these recipes, the user is presented with tips for varying with that specific recipe (e.g. replacing an ingredient). It provides inspiration by providing feedback on new recipes or seldom used ingredients.

A scenario study with seven participants was conducted. All participants were most positive about the first concept, as it would save them a lot of time when choosing their meal plan for the entire week. However, the inclusion of elements of the third concept was welcomed. Almost all respondents were the least positive about the second concept, as the application cannot provide insights in the week’s health indication was found to be a very useful guiding point in reviewing their past food choices.

FINAL PROTOTYPE: OVERVIEW AND PLANNING
The final concept consists of a combination of functionalities that are directly connected to the demands and wishes of potential end-users. The interface is based on the first concept in the previous section, as both the interface and its functionality were well-appreciated. In the final concept (Figure 2), users are presented with an overview of the recipes they prepared in the past week. The horizontal bar in which these recipes are shown enables the user to review past meal choices. At the top right corner the average health score of the chosen meals for the current week is given. In addition to this, users are able to set a personal health goal. With this goal setting functionality [4], the personalized RAS gives recipe suggestions that are based on the combination of the user’s present health score and chosen goal. Using selected recipes for future meals a preview health score is generated.

When the user decides to prepare this recipe in the near future, it can be appointed to one of the empty boxes in the bottom of the suggestion overview. Using the preferences and ingredients buttons, criteria can be set to further tailor recipe suggestions (e.g. the maximum preparation time, ingredients in the fridge, household members joining for dinner). By combining automated recommendations and user-selected preferences, the personalized RAS give easy access to recipes that match the user’s criteria.

Figure 2. Screenshot of final concept, where personalized recommendations are displayed that match the user’s health goal.

REFERENCES
A Personalized Recipe Advice System: additional information
Gijs Geleijnse, Peggy Nachtigall, Pim van Kaam & Luciënne Wijgergangs

During IUI 2011’s Demo Session, we wish to present MyCookingCompanion. As described in the 2 page demo note, this is a system that facilitates the user to easily select and prepare healthful meals. An analysis was performed why regular recipe website and cook books are so rarely used, especially on ‘routine days’. Although people recognize the importance of a healthy and varied diet, the lack of inspiration and difficulties with planning are the most important barriers to engage in such behavior.

The MyCookingCompanion targets to inspire its users to prepare and select healthful meals. By combining a smart browsing mechanism with personalized recommendations, the user can easily select a meal that meets his/her requirements. Using health scores, s/he is informed of the healthfulness of the meals, health goals can be set and progress can be monitored.
In IUI2011’s demo session, visitors are invited to interact with a working prototype version of the MyCookingCompanion. The UI will be in English.

We will bring:

- A tablet PC, to display and present the personalized recipe advice system.
- A mini-beamer and laptop, to give demos to a somewhat larger audience.
- A poster presentation to present the underlying design decisions.
- Enthusiastic presenters.

We need:

- A poster stand
- Wireless Internet access and power supply
- A table
- A screen or piece of wall at which we can point the mini beamer.