Fast Food: A quick-pick approach for a nutrition diary

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Abstract

Nutrition monitoring and logging is an important tool for inducing and maintaining a healthy dietary behavior. Today’s approaches have downsides with respect to usability and interpretability of data. We present a quick-pick approach that aims to balance the trade-off between the user’s effort and the preciseness of data. The evaluation via an Android app indicates that the approach is promising and may be feasible for long-term use.

Introduction and State of the Art

Nutrition is a major aspect of healthy living and a main cause for diseases such as obesity, diabetes, cardiovascular diseases and ultimately premature death. Observation and self-reflection are important components to help achieving and sustaining a healthy behavior⁷. For nutrition, monitoring via accurate log of food intake helps the progress of maintaining a healthier eating habit ². While monitoring certain behaviors (physical activity, fitness etc) can be supported by pervasive sensors, f.e. pedometers, for logging nutrition, manual diaries, either paper based or electronic, are commonly used.

Mobile digital nutrition diaries have been shown to help individuals gaining a deeper understanding of what they consume, help them to improve their dietary self-monitoring, and increase their awareness⁵. Two main approaches are pursued today: In database-driven applications⁴, the user looks up the consumed food in a database. While this approach should result in precise nutritional values, entering food is cumbersome for the user e.g. for mixed meals: The database may be incomplete particularly with respect to regional or cultural food, and estimating the portion size may be difficult. In photo-driven applications, the user takes a picture of a meal which may be used for reflection and manual analysis⁶ or for image-analysis and automatic interpretation⁷. Manual analysis is tedious; image-analysis remains challenging e.g. when differentiating yoghurt from whipped cream. Moreover, taking a picture of every meal is annoying and may be considered in many situations, and the photo must be taken before starting to eat, so second helpings and successive choices are difficult.

Approach and Implementation

We therefore aimed to find an approach for food logging which is quick and easy to use, does not interfere with normal eating behavior, and allows for ex-post analysis of the nutrition behavior. In a process with intensive user and expert involvement and after multiple discussions and studies, we came up with the “quick-pick” approach.

Specifying the food eaten is based on simple concepts frequently used in public health education. The type of food is based on categories such as grains, vegetables, fruit or dairy produce rather than specific foods. The amount of food is counted in portion sizes, where a portion is not precisely defined but assumed to be about the amount that fits into the user’s palm of hand. These concepts have proven to be a fair compromise between understandability on the one hand and expressive value on the other.

Figure 1. Logging, food categories, and feedback in the SNUDI app. Average usage through the day
For subsequent analysis, the food pyramid is used: In this model, the food categories that should be consumed frequently, such as vegetables, are arranged on the bottom and those which should be consumed rarely are arranged on the top. For each portion of a category eaten, one “brick” is put into place. Ideally at the end of the day, the food log should have the shape of a pyramid or triangle.

We implemented these concepts in the SNUDI- application (Simple NUtrition DIary) for the Android platform. The portions of a food consumed are arranged on a grid where the vertical placement indicates the time and meal, and the horizontal placement can freely be used by the user (Fig. 1, left). Each cell represents one portion. Tapping on a free cell opens the list of food categories (Fig. 1, second). The food categories are color coded. The user can switch between the dates by swiping horizontally. For analysis, the user can switch to a “pyramid” view (Fig. 1, third) where, for a given period of time, the average consumed food is shown in a food pyramid arrangement. This allows seeing how closely the user follows the recommendations of the food pyramid at a single glance.

Evaluation and discussion

For one week, we carried out a trial with 6 participants (3 male, 3 female). All of the participants used the prototype on a daily basis to log data. On average, the participants used the app for 4 minutes per day for logging food, and 1.2 minutes for checking the food pyramid. They logged 14.4 portions per day and 3.8 portions per meal. Usage for logging increases throughout the day with peaks around lunch and dinner times (Fig 1, right; blue: log; red: pyramid view). A more detailed analysis (not shown here) also shows that logging of one earlier meal also frequently happens retroactively during later meals. The app scored an average 96 of 100 points in the System Usability Scale. Two nutrition experts who reviewed selected diaries found the collected data to be sufficient for monitoring behavior and for self-reflection. They also pointed out that the food categories may not always be precise enough.

Users and experts are quite positive on the quick-pick approach for a mobile nutrition diary. The possibility for later recording food has shown to be important. In this aspect, the quick-pick approach is superior to image-based ones. The pyramid concept was well understood and enjoyed as feedback at the same time. The experts indicated that the simplifications induced by the food categories are acceptable. It was appreciated that more complete data is always preferable even when lacking preciseness.

Conclusion

Every manual diary for health logging has to cope with a trade-off between effort and precision of data. The quick-pick approach seems a promising compromise. It has the potential to improve adherence in the long-term leading to better nutrition monitoring. The approach is simple enough to be adaptable to other types of diaries as well. Some simple changes of graphical representations would e.g. allow implementing different food models, giving more guidance while logging or to log various behaviors such as snacking only, drinking enough or smoking.

References