Designing Sustainable Food Systems for the Point of Sale

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Introduction & Related Work

Even though many customers consider sustainability as an important factor in grocery shopping [4], there is a gap between this attitude and actual behavior when purchasing [1, 8]. One reason for this is the time required to analyze sustainability information on product packages, which contrasts with the approach humans typically use to make quick decisions, where only a very few important cues are considered and most of the available data is ignored [7]. Several shopping assistant systems at the point of sale have been presented in the past [5, 6, 9]; however, these approaches did not focus on sustainability aspects. A prototype considering these aspects was developed by Kalnikaite et al. [3] who designed a clip-on handle for standard supermarket shopping carts visualizing a product's food miles, whether it is organic or not, and comparing the overall food miles of all products in the cart to a social norm. Due to the nudge effect found in their study, we want to build upon this evidence but incorporate more aspects of sustainability in our system, including personalization functionality. In this paper we present an assistance system guiding customers towards more sustainable products at the point of sale. We first conducted an innovation workshop with stakeholders to gather requirements, and then created a prototype which was evaluated with a focus group in a real supermarket. Based on the findings of the evaluation, we propose an augmented reality-based customer guidance system.

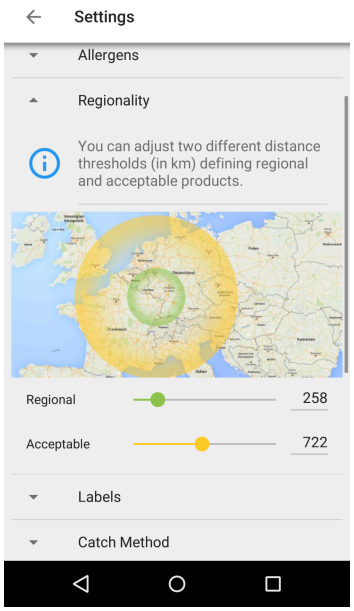

Figure 1: Personalizing the meaning of regionality in the smartphone prototype.

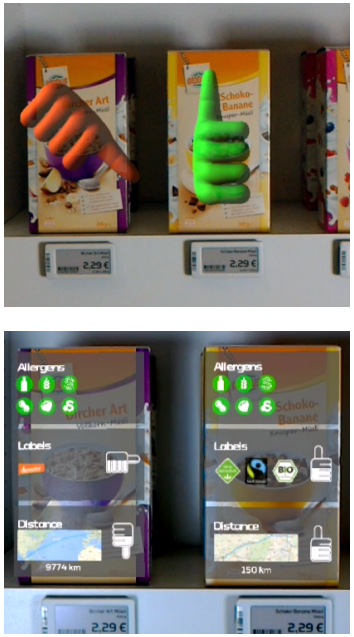

Figure 2: Visualizations of sustainability ratings in the HoloLens prototype.

Innovation Workshop & Prototype Design

To gather requirements for an assistance system guiding customers towards more sustainable products, we conducted a one-day innovation workshop with 22 relevant stakeholders. As a result we found that multiple dimensions of sustainability have to be integrated and parameterizable to achieve broad user acceptance. Since the prioritization of these aspects differs from individual to individual, it should be possible to weight them accordingly. Still, the visualization of a product's sustainability, given a user's profile, should be kept simple and easily comparable.

For a smart phone application, we picked the following aspects of sustainability: regional origins, labels (e.g. organic farming), catch methods for fish, allergens and obsolescence. When defining a sustainability profile, the meaning of each sustainability criteria can be specified (e.g. what distance is considered regional, cf. Figure 1). Furthermore, the different aspects of sustainability can be weighted. The settings can also be overridden for single product categories, e.g., to specify that local production is important for fruits but not for coffee, where regionally grown alternatives do not exist. When scanning a barcode, the prototype visualizes how well the product matches the user's sustainability profile in a level of detail defined by the user: a thumb showing an aggregated rating, a more detailed view displaying the ratings per sustainability aspect or a full-screen view showing all data stored about a product.

Qualitative Evaluation & Second Prototype

To analyze changes in purchasing behavior, we conducted an evaluation in a supermarket by asking nine participants to go shopping first without and then with the prototype, followed by a group discussion. Several participants stated that they purchased a product other than their usual choice with the app, since it matched their sustainability profile better. Two subjects who explored nearly every product with the app described the shopping experience as "zombie-like"; however, it was argued that users would quickly learn which standard products fit their profile, so the number of scans would decline. According to a participant a rebound effect [2] might occur: customers might act less sustainably in other areas because they buy more sustainable groceries with the app. Nevertheless, the potential was recognized to purchase more sustainable without investing too much time.

To support hands-free shopping and to overcome the issue of a "zombie-like" shopping experience, we started investigating the use of HoloLens smart glasses to create an augmented reality version of the prototype. Setting the sustainability profile is realized completely analogously to the first prototype, but the products are recognized using the Vuforia platform and the personalized sustainability rating is directly visualized in 3D in the see-through displays with the help of the Unity engine. Differently detailed visualizations of the results are rendered above the surface of a product depending on the distance to the user (cf. Figure 2).

Conclusion

To summarize, the innovation workshop and the evaluation showed a great interest in sustainable food systems. We learned that multiple dimensions of sustainability should be considered when designing such systems and that participants have highly individual understandings of sustainability. The qualitative analysis showed that customers can indeed be convinced to buy more sustainable products using our prototype. A second system using augmented reality on the HoloLens was developed to allow hands-free interaction within the supermarket. While this new approach offers a more futuristic view of sustainable food systems, it requires the packages as image targets as well as the product information in digital form.

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