Understanding Underutilisation: Methods for Studying Fruit and Vegetable Buying Behaviours

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Abstract

This paper outlines research focused on understanding why people do or do not buy underutilised fruit and vegetables. This will inform the design of future interventions to promote more sustainable food related behaviour. A background to underutilised crops and food sustainability is provided. This is followed by an overview of the proposed method for capturing the entire purchasing and consumption experience using wearable cameras.

Author Keywords

Food Security, Digital Ethnography, Wearable Cameras

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

This paper provides an overview of ongoing research investigating why people do or don't buy underutilised fruit and vegetables. Underutilised crops are those that were once grown more widely or intensively but are now falling into disuse for many reasons [5] and they could play a key role in ensuring greater food security.

Figure 1 – Kedondong (Spondias dulcis). An underutilised fruit in Malaysia

Our approach is to use surveys and digital ethnography techniques to gather this data and build a picture of the entire experience of food consumption including planning, procurement, preparation, consumption, and disposal. Through this approach we hope to identify barriers and opportunities related to the purchase of underutilised crops, in order to inform the creation of digital interventions to encourage more sustainable behavior. This paper will discuss the concept of underutilised crops and the role they play in ensuring food sustainability as well as our proposed method for 'understanding underutilisation'.

Background

Food security is an important topic concerned with ensuring the continued supply of food and nutrition as the population of the world increases. "At present, analysis suggests that current trends and patterns of food consumption will remain unchanged and are highly unsustainable whether measured for public health, environmental impacts or socioeconomic costs" [6].

Historically humans have used 40,000 to 100,000 plant species for food, fiber, crafts, industrial, cultural and medicinal purposes. Around 7000 cultivated species are still in use around the world. Yet over the last 500 years, around 30 species have become the basis for most of the world's agriculture. Half of humanity's needs for energy and protein are being met by just three crops – maize, wheat, and rice. This leads to vulnerabilities as the speed and intensity of social and environmental change increase [5].

Our research is being carried out in partnership with the Crops For the Future Research Centre in Malaysia, whose aim is to carry out research into underutilised plant species and related knowledge systems, many of which can contribute to food and nutritional security.

Underutilised crops are those that were once grown more widely or intensively but are now falling into disuse for many reasons. Farmers and consumers are using these less as they are not competitive with other species in the same agricultural environment. Yet these crops may be nutritionally rich and can encourage better food security and nutrition, ecosystem stability, and cultural diversity [5]. By encouraging people to make use of these currently 'underutilised' crops, it may provide greater biodiversity, and contribute to the improved sustainability of food supplies. Thus it is important to consider ways to encourage people to consider integrating these products into their diets.

The Role of Technology

In the past, interventions such as public awareness campaigns have been successful in changing consumer dietary patterns, and initiatives already exist for curbing food loss and waste [6]. Environmentally sustainable food behaviour is a growing field within HCI research, with previous studies looking at reducing greenhouse gas and waste linked to food consumption [2][3][4]. Technology is now being developed that aims to promote more sustainable behavior, such as the 'BinCam' [3] that shares photos of waste disposal on social networks in a bid to change existing habits.

We aim to inform the design of technology to promote more sustainable consumer buying behavior, with a particular focus on underutilised crops. It is hoped that by encouraging people to seek out underutilised crops, this may drive greater demand for them, which will in turn 'pull' supply.

Figure 2 - Autographer Camera (source: www.autographer.com)

Figure 3 - Memoto Camera (source: www.memoto.com)

Our Vision

We are seeking to investigate how people currently purchase and consume fruit and vegetables. Specifically we are not only studying decisions at the point of sale, but also including the entire process of food consumption, including planning meals and shopping trips, the buying process, consumption, and reflection afterwards. This will allow us to pay particular attention to the ways in which people mediate their behaviour with tools and artefacts, as this may be where interventions can be made; for example when people are planning their meals, or writing shopping lists.

Methodology

This research will be carried out between July and December this year in both the UK and Malaysia. We will initially deploy broad online surveys to gain a high-level understanding of consumption behaviours and mediating artefacts. We will then investigate this further with a smaller set of participants using more in-depth and qualitative techniques.

Self-reported experience sampling techniques such as diary studies can suffer from reliability problems, especially regarding food consumption [7]. Ethnographic observations can overcome these problems but may not be feasible given the extended periods of time being studied and the irregularity of the targeted behaviors. To tackle this, previous studies of food related behaviours have situated cameras in the kitchen to capture food related activities. These include the 'Hobcam' [2] and 'FridgeCam' [4]. However as the behaviours we are interested in span a number of locations we wish to use wearable, first person perspective cameras (e.g. Sensecam, Autographer (Figure 2) and Memoto (Figure 3) that capture still

images passively at set intervals. We hope that through this we can capture a range of food related activities over prolonged periods of time. These images will then be analysed and used as resources for prompting reflection in later interviews.

Related Work

As wearable camera technologies emerge, studies have begun to identify their use in research settings. For example, traditional ethnographic techniques have been supplemented with the SenseCam when studying the information access practices of medicine researchers to observe practices and provide a visual record for probing during follow up discussions [1]. Mobile phones worn around people's necks have also been used to help document dietary choices with annotated images [8]. Recently SenseCam has been used to establish the reliability of self reported calorie intake in a food diary in which it was found that out of 34 participants only one food diary accurately matched the images capturing the actual intake [7]. This shows how passive monitoring can overcome the issues with traditional self reported measures, but the authors state that it should augment rather than replace existing techniques.

All three studies encountered problems with low image quality at times, due to movement and low light and problems with users making errors with the cameras (such as forgetting to switch them on) [1][7]. Tools may also be needed to manage, share, analyse, and understand the large data sets being generated [8].

These are problems that we are likely to face, particularly dealing with image sets from multiple days of camera use. There may also be privacy issues with

photographing people's activities, especially at home. However, we believe that it is vital to look for ways to capture the food consumption practices of consumers in order to design appropriate and successful interventions. We will therefore refine and reflect on these techniques for studying food buying and consumption behaviour during our studies.

Expected Outcome

This paper has provided a background to the role that 'underutilised' crops can play in ensuring greater food sustainability. Our proposed work aims to use wearable cameras to explore current behaviours related to the purchase and consumption of fruit and vegetables in both the UK and Malaysia. This will then be used to identify implications for the design of technologies to promote more sustainable behaviour. We will also explore the differences in behaviour between the UK and Malaysia in relation to this.

In summary, this work introduces a different perspective on sustainable food behaviours within HCI as well as proposing a method for studying the entire food consumption experience using wearable cameras.

Acknowledgements

References

[1] Byrne, D., Doherty, A.R., Jones, G.J.F., Smeaton, A.F. Kumpulainen, S., & Järvelin, K. The SenseCam as a tool for task observation. In *Proc. 22nd BCS HCI Group Conference*, Liverpool, UK (2008).

[2] Clear, A.K., Hazas, M., Morley, J., Friday, A., & Bates, O. Domestic Food and Sustainable Design: A study of University Student Cooking and its Impacts. In *Proc. CHI 2013*, ACM Press (2013), 2447—2456.

[3] Comber, R. & Thieme, A. Designing beyond habit: opening space for improved recycling and food waste behaviours through processes of persuasion, social influence and aversive affect. In *Personal and Ubiquitous Computing* (13 July 2012), 1—14

[4] Ganglbauer, E., Fitzpatrick, G., & Comber, R. 2013. Negotiating Food Waste: Using a Practice Lens to Inform Design. In *ACM Transactions on Computer-Human Interaction 20*, 2 (2013).

[5] IPGRI. Neglected and Underutilised Plant Species: Strategic Action Plan of the International Plant Genetic Resources Institute, International Plant Genetic Resources Institute, Rome, Italy (2002).

[6] Moomaw, W., T. Griffin, K. Kurczak, J. Lomax. The Critical Role of Global Food Consumption Patterns in Achieving Sustainable Food Systems and Food for All, A UNEP Discussion Paper. *United Nations Environment Programme, Division of Technology, Industry Economics*. Paris, France (2012).

[7] O'Loughlin, G., Cullen, S.J., McGoldrick, A., O'Connor, S.,Blain, R., O'Malley, S., Warrington, G.D. 2013. Using a Wearable Camera to Increase the Accuracy of Dietary Analysis. *American Journal of Preventive Medicine 44*, 3 (2013), 297—301.

[8] Reddy, S., Parker, A., Hyman, J., Burke, J., Estrin,D., & Hansen M. 2007. Image browsing, processing, and clustering for participatory sensing: lessons from a DietSense prototype. In *Proc. of the 4th Workshop on Embedded Networked Sensors* (EmNets 2007). ACM (2007) 13—17.