Documenting and Understanding Everyday Activities through the Selective Archiving of Live Experiences

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Abstract

The goal of this research is to build upon the work of capturing data in structured and planned settings to develop socially appropriate ways to archive important life experiences during unexpected, unstructured, and sometimes informal situations. This work involves three significant phases: formative studies to understand the data capture needs of particular populations of users in these situations; design and development of a technical architecture for capture and access in these settings coupled with design and development of applications for two specific domain problems; and evaluation of this solution as it pertains to these domain problems.

Keywords

Capture and access, ubiquitous computing, privacy, special education.

ACM Classification Keywords

H5.2 User Interfaces, K4.2 Computers and Society, Social Issues, K.4.3 Organizational Impacts

Introduction

Even under the most informal of circumstances, people often want a record of what occurred. These records can be used to augment human memory, to share experiences with others who were not present, or simply to provide an archive for which future uses have not been clearly defined. Thus, many researchers have explored ways in which people can capture, either automatically or manually, the details of experiences. Abowd and Mynatt define this broad capture and access problem as capturing information so that it can be successfully accessed later [1]. The goal of this research is to further exploration of the specific natural environment capture and access problem. I define this problem as the capture of information in an unstructured and unexpected situation that is often informal in nature so that it can be successfully accessed at a later date.

Capture of information can be extremely difficult when recording that data was not planned beforehand or when the setting is so informal and unstructured that it does not naturally afford recordkeeping. For example, many proud parents would like to have their babies' first steps on video, but not knowing when those special moments would occur, they often missed them. As another example, anyone who has walked away from a conversation having already forgotten a new acquaintance's name can attest to the power of social stigma surrounding both writing down that information and forgetting it.

I chose to explore in depth the important challenge of recording data about children with autism (CWA), because many of the concerns about learning for CWA center on their abilities to generalize teachings to the larger world. Understanding the specific requirements of capture and access in these unstructured settings allows us to inform the design of capture and access applications for other domains that can be quite different from record keeping for CWA. By further mapping out the design space of capture and access for the natural environment, I hope to motivate researchers to explore unstructured and informal capture settings in different domains. I also hope to provide guidelines for design that may assist them in these explorations.

Specifically, this work contributes to HCI in two ways. The first contribution is a method for the capture of rich data that addresses inherent social and technical concerns, particularly those of unstructured and informal environments. This work further contributes to the field by providing an exploration of the application of capture technologies to two distinct domain problems: behavioral analysis (a new domain problem for HCI) and informal meetings and socialization (a problem that has been previously explored by others as well).

Experimental Design

As part of a larger research team, I conducted formative studies to understand the tensions inherent to data capture in unstructured and informal environments [2, 3, 4]. From this work, a set of socio-technical concerns and design requirements to address these concerns were uncovered. The result of this understanding then was the design of the *Experience Buffers* architecture for *selective archiving* of captured data streams. These guidelines and the resultant architecture are described in this section.

Tensions of Capture and Access in Natural Settings

▪ People need or want rich data for quality monitoring, analysis, and diagnostic work, but there is a tension between the desirability of richer data, including video, and the effort of retrieving and analyzing that data.

▪ The burden of recording information must be significantly low to not interfere with caring for a child, conducting a meeting, or other activities.

▪ Concerns about privacy, surveillance and control of data must be sufficiently balanced with social advantages including better work practices and the possibility of building trust and a culture of sharing among team members in group work environments.

▪ New technologies must be sufficiently inexpensive so as not to add burden to already financially constrained schools and families or other stakeholders.

▪ Capture applications must relate streams of data about any particular event to each other as closely as possible without need for human intervention.

▪ Individuals in a variety of settings must be able to add or remove capture services in an environment depending on the current context of that environment and needs of the individuals in that environment.

▪ In the case of chronic care management, caregivers must be able to use captured data to diagnose particular behaviors, to inform decisions about structuring future interventions, and to provide evidence to concerned parties about the effectiveness of interventions. In other domain problems, users must similarly be able to use the captured data to augment their own practices. Thus, they must have access to both appropriate abstracted visualizations and sufficient details.

Balancing Considerations

We can balance the concerns surrounding capture in an informal environment and/or unplanned situations through *selective archiving*, which is a collection of capture services embedded in an environment. These services are always on and available but require explicit user action to store an experience.

The Experience Buffers architecture is a prototype instantiation of the idea of selective archiving [5]. Capture services in the environment record, automatically delete, and allow for manual archiving of audio and video data. As part of this research agenda, two systems were also built to take advantage of the Experience Buffers architecture:

• CareLog, a system to assist caregivers of CWA in documenting and analyzing specific unplanned incidents of interest as part of a specific diagnostic technique, functional behavior assessment (FBA).
• BufferWare, a system to allow for the capture of impromptu meetings and conversations in a semi-public space.

Evaluating the Experience Buffers and Selective Archiving

I am currently in the process of evaluating these systems through two studies: a quasi-controlled study of CareLog for a specific behavior assessment process in a public school and a long term deployment study of BufferWare in a social commons area of my university.

In the CareLog study, four teachers will each assess the behavior of two students in their classes. They will use CareLog for one student and will use traditional pen and paper methods for the other. The ordering will be counter-balanced, and students needing assessment

will be randomly assigned. We will validate the quality of the assessments, measure the efficiency of the process (*e.g.* time required to collect sufficient data), and evaluate the effect on teachers (*e.g.* comparative task load analyses between the two methods and qualitative inquiries).

In the BufferWare study, the system has been in use for three months. Prior to this time period, we catalogued the use of the space by semi-randomly sampling the space, logging how many people were using the space, at which of the three tables were they sitting, and what were they doing at the time of the sample. We have continued this sampling throughout the deployment time period. After allowing for sufficient time for the novelty of the system to dissipate, we will employ a constant sampling technique for two months this spring in which we log, using motion sensors, how often someone is in the space and compare this information to the usage logs indicating deletion and archival of data. We also interviewed residents of the floor being used before and will continue interviewing during the deployment of the technology. Finally, we are collecting data through a forum for anonymous feedback on the BufferWare system's web site.

These two studies provide a platform for studying how selective archiving addresses (or doesn't) the challenges inherent to capture in the natural environment. Furthermore, using these systems, I am able to explore these challenges in depth, uncover other challenges and opportunities, and reveal some of those situations and domain problems in which

buffering is a solution to capture and those in which other solutions may be more appropriate.

Acknowledgements

References

[1] Abowd, G. D. and Mynatt, E. D. 2000. Charting past, present, and future research in ubiquitous computing. *ACM TOCHI 7, 1* (Mar. 2000), 29-58.

[2] Hayes, G.R., Abowd, G.D., Tensions in Designing Capture Technologies for an Evidence-Based Care Community, To appear in *Proc. CHI 2006*, ACM Press (2006).

[3] Hayes, G.R., Kientz, J.A., Truong, K.N., White, D.R., Abowd, G.D., Pering, T. Designing Capture Applications to Support the Education of Children with Autism. *Proc. Ubicomp 2004*, Springer-Verlag (2004), 161-178.

[4] Hayes, G., Pierce, J.S., and Abowd, G.D. Practices for Capturing Short Important   Thoughts. *Extended Abstracts CHI'03,* ACM Press (2003), 904-905.

[5] Hayes, G.R., Truong, K.N., Abowd, G.D., Pering. T. Experience Buffers: A Socially Appropriate, Selective Archiving Tool for Evidence-Based Care. *Extended Abstracts CHI 2005*, ACM Press (2005), 1435 - 1438.