

Finding the Unknown – Serendipitous Discovery in Co-located Consumption of Digital Photo Collections

Otmar Hilliges

University of Munich
Media Informatics Group
Otmar.hilliges@ifi.lmu.de

ABSTRACT

In this position paper we report initial findings from our experiences with developing photo sharing applications surrounding interactive tabletop displays. Especially the support for casual browsing, sidetracking and storytelling emerge as key challenges in order to foster communication around photo collections. Furthermore we discuss implications of our findings for the future development of such systems.

Author Keywords

Photoware, interactive surfaces, single display groupware, tabletop.

ACM Classification Keywords

H.5.2 [User Interfaces]: Graphical User Interfaces (GUI), Input devices and strategies. H.5.3 [Group and Organization Interfaces]: Collaborative computing.

INTRODUCTION

Recent progress in the field of multi-touch interactive surfaces makes it imaginable that our daily environments will become interactive and acquire new functionalities provided by computing capabilities. For example, walls, doors and tables could double as displays and accept input. The spatial and social affordances of tables predestine them for sharing media artifacts. It is imaginable that a couch table could become interactive and serve as a media hub where friends and family gather together and exchange stories and experiences surrounding their media collections.

In recent years many studies surrounding photos, both digital and analogue, have been conducted [4,6,12] in order to understand the life-cycle of photographs and the social practices surrounding them. In essence a robust ecology of practices can be observed including archival and storage but also retrieval and manipulation in the context of face-to-

face sharing and storytelling. Especially physical photos afford natural and flexible interactions and are thus well suited for the highly dynamic and unstructured activities of photo-talk. On the flip side printed photos suffer from their physical constraints as they can't be replicated and stored as easy as digital photos. In consequence archiving and safe keeping of photo collections often attains precedence over sharing and manipulating photo collections.

As digital photography increasingly replaces its analogue counterpart the digital qualities of photos (i.e., ease of storage, retrieval, replication and manipulation) might cause a shift in practices surrounding the activities of browsing and sharing photographs. Current photo management tools are generally optimized (and evaluated) towards efficient retrieval of specific images (e.g., [1,11,14]). Kirk et al. observed that users seldom engage in goal-oriented search activities, which suggests that other functionalities might be more important for the future development of photoware.

Co-located sharing of media is frequently named the most compelling activity [4] for digital media users. It depends heavily on verbal and non-verbal communication. Interactive tabletops offer a compelling platform for shared display collaboration, allowing multiple users to interact simultaneously with a shared information landscape and thus bridging the gap between digital and printed photos. Several projects have successfully demonstrated that these interfaces can support the co-located sharing of image collections [10,13,16]. Most of these systems still focus on providing users with means to search for and retrieve images quickly.

In this position paper we argue that in order to foster communication surrounding photo collections we need photo applications that support users with increasingly flexible interfaces to engage in a variety of activities from casual browsing, rapid triaging to loosely structured story telling as well as the support for sidetracking (i.e., on the fly adjustment to the current goal) caused by serendipitous discovery. We also present design considerations that we drew from the development and evaluation of tabletop photo applications.

LESSONS LEARNED FROM PHOTOHELIX

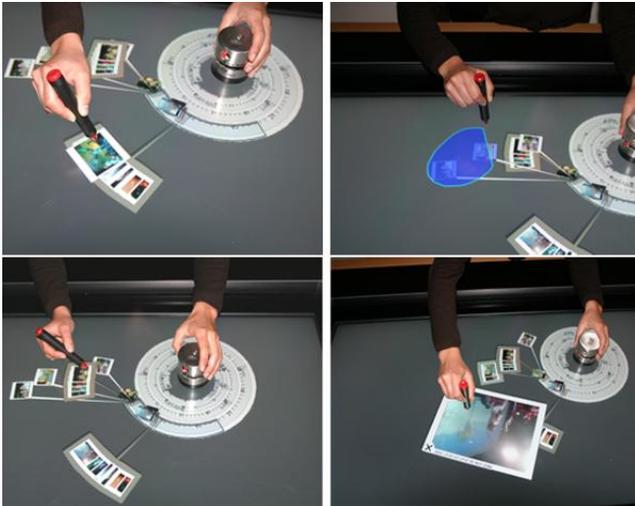


Figure 1: Co-Experienced media access. Users have replicated controls as well as re-orientable and replicated data artifacts to enable truly parallel interaction and sharing of pictures.

As an example system we have developed Photohelix (see Figure 1), a photo-browsing application tailored for filing, co-experienced browsing and sharing of pictures on an interactive digital tabletop¹. The system uses the notion of time and events to organize and pre-cluster collections. Events are represented as image piles on a helix-shaped calendar. The helix is generated dynamically and spans the entire collection from the oldest pictures on the inside to the newest pictures on the outside.

Events and pictures are accessed, manipulated and inspected using a hybrid, bi-manual interaction technique. The non-dominant hand operates a physical handle to position and control the calendar view (rotation adjusts the current time setting). The dominant hand is used to inspect and modify events as well as individual pictures for browsing and sharing purposes. Every user can bring his/her own helix to the table, thus the physical handle serves as an incarnation of personal collections. A user study with 20 participants yielded positive results and encouraging feedback. The detailed findings have been reported in a separate paper [7].

In addition to the general usability results we made two observations frequently. We think support for these activities could change users' behavior surrounding photo collections and positively impact social practices.

Equal Distribution of Attention

Research suggests that one of the main motivations for storing and archiving of photos is clearly sharing thereof [4,12]. However, it seems that in many cases only recent pictures are actually touched upon in this context, while older pictures are accessed less frequently and are mostly

kept because the owners want to be able to go back to them if they want to.

In anticipation of this behavior we design the calendar view in Photohelix such that the older pictures are displayed smaller than newer pictures. In contrast we found that across users the time each event (set of pictures) was inspected remained roughly uniformly distributed. This is especially interesting because the participants brought a subset of their own collection so they were familiar with the content. Hence it might be possible that our design encourages users to revisit older pictures in their collection more frequently and consequentially communicate more about the events depicted.

Serendipitous Discovery

Our study was designed to expose the participants with the complete set of the system's functionality and users were given four well defined tasks aimed at the activities browsing, triaging, organizing and sharing (as in storytelling). Participants were also asked to think a loud what they were trying to do at any given time.

We frequently observed that participants would modify their current plan or change their goal altogether because they tripped over a picture or event they weren't particularly looking for. For example, some participants did end up telling an anecdote about a recent dinner with their partner, while the original task was to give an update about their last vacation. A behavior previously observed and described as sidetracking in sharing of music and ring tones for mobile phones [3]. Furthermore, and more important did we observe that users formed new association chains from these sudden changes of plan. In the above example the particular user aired the wish to invite the partner for another dinner in the near future after finding the (unexpected) photos. We argue that this is a wishful behavior and should be supported explicitly.

DESIGN CONSIDERATIONS

In order to inform future developments of co-located photo applications we present a few factors that we think will foster communication about photo collections.

- *Overview at all Time* – a visualization that represents an entire digital photo library, but also conveys information about where to find specific images when needed. For example, the helix shaped calendar with stacks of thumbnails.
- *Flat Hierarchies* – In order to support serendipitous discovery and sidetracking users should automatically be provided with more detail once they inspect a specific region such as the thumbnail preview in Figure 1, left. Furthermore should users be able to access individual images rapidly (Figure 1, bottom right).
- *Embodied Interaction* – in order to uphold communication it is important that the system allows

¹ www.medien.ifi.lmu.de/team/otmar.hilliges/files/ph.avi

for seamless social transitions between individual and group work [15] as well as for an immersion of users into the task – or in this case the conversation. In Photohelix we observed that users would operate the system after some time increasingly eyes-free thus they did not need to shift their attention from the story they were telling to the manipulation of the calendar. We accredit this to the use of the physical handle as control object for the collection which allows for embodied interaction [5].

- *Pseudo Physicality* – In order to create a richer experience and also to reduce the interaction hurdle for novel users the close resemblance of interface elements to the real world should be maintained. Touch sensitive interfaces and fluid gestures make using the digital artifacts more continuous and analog. This allows users to apply strategies they already use in the real world to both implicitly and explicitly convey information about the objects in the environment. Future applications could build on this by employing physics simulation [1] to create a more life like behavior of interface elements (e.g., photos with paper like qualities).
- *Meta Physicality* – Even if the close resemblance of virtual items to real world artifacts is beneficial to the ease of learning the interface, it is worth exploiting the specific and different affordances of digital media. These can augment physical actions, providing effects which are only possible in the digital realm. For example, skidding of photos to explicitly initiate a conversation with someone on the other side of the table or simply scaling and warping of photos. As long as objects have a clearly distinct and explainable behavior, users seem to be willing to accept and use a technique even if it is unrealistic in the strict sense.

CONCLUSIONS

In this paper we have outlined our experiences from the development and evaluation of Photohelix and other tabletop applications [7,8,9] we have also presented a set of design considerations that we think could help to inform the future development of tabletop applications that foster communication and sharing of photo collections. We have particularly identified the importance of support for casual browsing (as opposed to searching) and serendipitous discovery as well as sidetracking.

REFERENCES

1. Agarawala, A., Balakrishnan, R. Keepin' it Real: Pushing the Desktop Metaphor with Physics, Piles and the Pen. In *Proc. of CHI'06*.
2. B. Bederson. Photomesa: a zoomable image browser using quantum treemaps and bubblemaps. In *Proceedings of UIST'01*.
3. Bentley, F., Metcalf, C., and Harboe, G. 2006. Personal vs. commercial content: the similarities between consumer use of photos and music. In *Proc. CHI 2006*.
4. Crabtree, A., Rodden, T. & Mariani, J. Collaborating Around Collections: Informing the Continued Development of Photoware. In *Proc. CSCW 2004*.
5. Dourish, P.: Where the Action is. The Foundations of Embodied Interaction. *Bradford Books*, 2001.
6. Frohlich, D. M. Kuchinsky, C. Pering, A. Don, and S. Ariss. Requirements for Photoware. *Proc. CSCW 2002*.
7. Hilliges O., Baur D., Butz A. Photohelix: Browsing, Sorting and Sharing of Digital Photo Collections. In *Proc. TABLETOP'07*.
8. Hilliges O., Terrenghi L., Boring S., Kim D., Richter H., Butz A. Designing for Collaborative Creative Problem Solving. In *Proc. Creativity & Cognition'07*.
9. O. Hilliges, M. Wagner, L. Terrenghi, and L. Butz. The Living-Room: Browsing, Organizing and Presenting Digital Image Collections in Interactive Environments. In *Proc. of IE '07*.
10. U. Hinrichs, S. Carpendale, and S. Scott. Evaluating the effects of fluid interface components on tabletop collaboration. In *Proc. AVI'06*.
11. Huynh, D., Drucker, S., Baudisch, P., and Wong, C. Time Quilt: Scaling up zoomable photo browsers for large, unstructured photo collections. *Proc. CHI 2005*.
12. Kirk, D., Sellen, A., Rother, C., Wood, R. Understanding Photowork. In *Proc. CHI 2006*.
13. M. Morris, A. Paepcke, and T. Winograd. Teamsearch: Comparing techniques for co-present collaborative search of digital media. In *Proc. TABLETOP '06*.
14. Schneiderman B., Bederson B. B., Drucker S. M.: Find that Photo. *Comm. of the ACM V. 49*, 2006.
15. S. Scott, K. Grant, and R. Mandryk. System guidelines for co-located collaborative work on a tabletop display. In *Proceedings ECSCW 2003*.
16. C. Shen, N. Lesh, F. Vernier, C. Forlines, and J. Frost. Sharing and building digital group histories. In *Proceedings CSCW '02*.