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# PhotoArcs: A Tool for Creating and Sharing Photo-Narratives

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## **Abstract**

The PhotoArcs interface aims to enable easy and fun creation and manipulation of photo-narratives to encourage sharing and interaction. PhotoArcs leverages the benefits of existing sharing habits both online and face-to-face. We describe our design of the PhotoArcs interface, report on the results of an exploratory low-fidelity usability study with five participants, and outline future directions.

## **Keywords**

Photography; photo-narratives; photo-sharing; social uses of photography

## **ACM Classification Keywords**

H.5.2 User Interfaces: User-centered design; H.5.2 User Interfaces: Human factors

## **Introduction**

The goal of the PhotoArcs project is to enable photographers to add narratives to their online photograph collections in a way that mimics face-to-face sharing patterns. Using PhotoArcs, users can organize their pictures into linear arcs connected by textual narratives. Users can also view the ways in which their narratives intersect with others' narratives, create and view multiple versions of a particular narrative for different audiences, comment on others'

narratives, and more. These interactions introduce a nonlinear element by providing jumping-off points or tangents from their own narratives.

The project is heavily influenced by our ongoing investigations into the social uses of photographs [9]. We have found that one of the primary uses of photographs is for sharing, where sharers construct narratives around the photographs they show which then reinforce relationships and group identity [2, 7, 8]. One of the advantages of face-to-face photo-sharing is the narrative flexibility the sharer (and recipient) has. Existing digital photo-sharing mechanisms do not enable this kind of flexibility, interaction, and play. Our goal is to extend the flexibility of online sharing into a digital medium.

The PhotoArcs project is also inspired by other examples of “ludic technologies” [4] – technologies that are designed to invite playfulness and exploration. In particular, storytelling itself is a ludic activity; PhotoArcs should support the playfulness of narrative creation.

### **Related Work**

The human-computer interaction community has long been working together to tackle the problem of digital photograph storage and sharing, though few interfaces have focused specifically on narrative-creation for sharing. In addition, researchers in the social sciences have explored personal photography. We will summarize research in both fields in this section.

#### *Digital Photography*

Many tools exist to help people organize and retrieve their digital photographs, though few explicitly help in

sharing and only one explicitly supports the creation of narratives for sharing purposes. MediaBrowser integrates many previous research ideas and provides many views, including a time-based view, and many interaction mechanisms, including a two-level fisheye and easy selection by group or keywords [3]. Fotofile incorporates narrative-making, as well as bulk annotation, a hyperbolic tree view, and some automatic feature extraction, into a digital album-making system, but mainly for archiving rather than sharing [6].

Balabanovic et al. created a tool explicitly for narratives and sharing digital photos [1]. Audio can be recorded over a photostream to create a multimedia narrative which can be sent to distant others, though the interface is best with copresent others.

#### *Photography and Narratives in the Social Sciences*

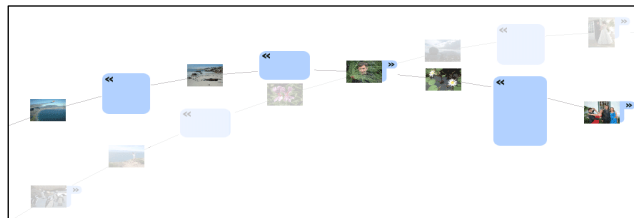
In addition to this work in HCI, research in areas such as sociology, anthropology, visual studies, and cultural studies address photography and photo-sharing as a social activity. Chalfen [2], Musello [7], and Rose [8] all conducted open-ended interviews about family photography, focusing on family snapshots and albums. They elaborated on the ways personal photography contributes to identity creation, communication, and other social actions. In our recent research, we found that cameraphones connected to internet-based sharing have some uses in common with family photographs [9]. The most common audience for photo-sharing is others who were at the same event or those that “should have been there” (as one interviewee stated) – people who know those who were at the event and have an interest in finding out the details of what happened.

Despite this rise in internet-based sharing, we have found that people value prints more than digital photos and prefer an element of human interaction and feedback in their photo-sharing – the best being face-to-face, but also over the phone or through email or instant messaging [9]. As more people adopt digital cameras and start wanting to share photographs with distant friends and family, the need for easy-to-use photo-narrative tools such as PhotoArcs that combine the advantages of face-to-face sharing and online dissemination becomes ever-greater.

### The PhotoArcs Visualization

#### DESCRIPTION

The PhotoArcs visualization aims to leverage the convenience, flexibility, and fun of face-to-face sharing along with the persistence and easy remote sharing of



**Figure 1.** Two intersecting PhotoArcs with some expanded and some collapsed textboxes

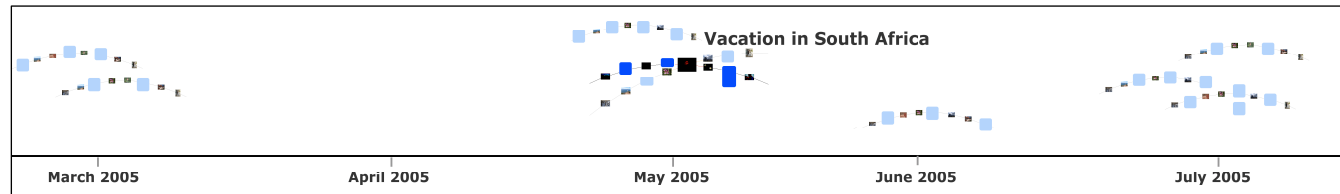


**Figure 2.** Mock-ups of selecting and removing a photo and its associated text box by dragging

online interfaces to encourage users to create digital photo-narratives. These photo-narratives take the form of timelines or “arcs” to take advantage of the strong chronology of photographs and further encourage narrative creation and interaction on a photo-by-photo and story-by-story basis, similar to the interactions in face-to-face sharing. Photos that are re-used in different narratives appear at the intersections of the respective arcs in the interface (Figure 1), allowing the storyteller or the listener to follow tangents of the main story and thus introducing a nonlinear element into the narratives.

Much of the PhotoArcs interaction is drag-and-drop. Users can click and drag photos around the screen, drop photos on an arc, “tear” photos from an arc (Figure 2), and rearrange photos. Dragging a photo to an arc automatically pops up a text box, into which the user can type. These text boxes by default expand to fit all of their text, but can be resized by dragging their corners or collapsed by clicking on their associated chevrons (« or »; see Figure 1). This allows viewers to peruse just the images in a PhotoArc if they wish. These interaction styles encourage direct manipulation of the narratives and minimize dialogs and other indirect input in order to support more “playful” interaction.

We considered several options for PhotoArcs with so many photos that they cannot fit legibly on the screen, including a telescoping arc, an arc that curls at the ends, and a scrolling arc. Based on feedback from our usability studies described below, we decided that the best option was an arc that scrolls off the screen and re-centers on a clicked photo.



**Figure 3.** Timeline overview of PhotoArcs (the mouse is hovering over the active arc, bringing up its name)

We also decided to provide several overviews of all arcs to help different navigation styles. Intersecting or related arcs are shown on the screen with the primary arc (Figure 1). Arcs are also loosely arranged according to the time the photographs on them were taken, and the user can zoom out to see all arcs arranged on a scrollable timeline view (Figure 3). In this view, the active arc is still highlighted in the same ways shown above. Hovering over an arc shows the arc's name and any other metadata the system has stored about the arc.

In addition to this summary view, a detailed view featuring just one photograph is provided when users double-click a picture.

Though initially we also wanted to implement a photo-organization tool to help users browse through photographs that are currently not on arcs, we observed that such an effort would, at best, duplicate many other photo-organization research studies. Ideally, we would integrate a photo-organization tool into the background of the PhotoArcs interface to allow for easy image browsing and selection. For the purposes of this project, though, we decided to focus on the visualization and interaction techniques involving the PhotoArcs themselves, and leave the integration of non-arc photo-browsing to future work.

#### TARGET AUDIENCE

The target audience for PhotoArcs is anyone interested in sharing digital photographs, especially those who currently take a lot of digital photographs including photobloggers, family photographers, and other life-chroniclers.

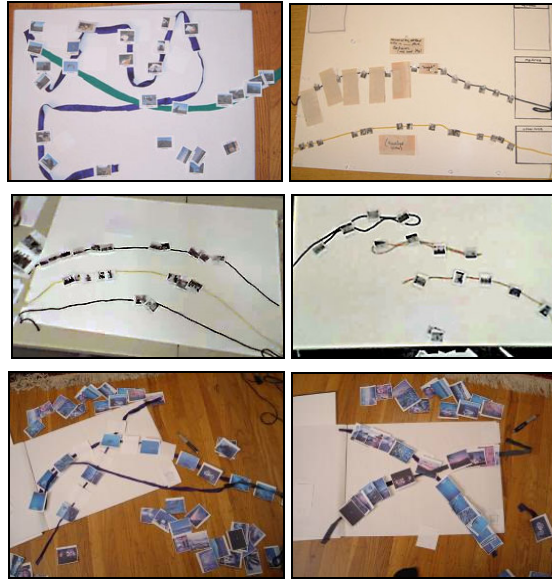
#### IMPLEMENTATION

Our initial prototypes consisted of sketches and low-fidelity prototypes (Figure 4). We used the latter in our user studies, described below. We mocked up additional prototypes with drawing programs. We began implementing our interface in Java using the prefuse package [5], particularly experimenting with the force-directed layout functions. (Figure 1, Figure 2, and Figure 3 are augmented screenshots from our Java implementation.)

### Exploratory Low-Fidelity Evaluation

#### Participants

Five participants tested a low-fidelity prototype of the PhotoArcs interface. Two are female and three male; four are Master's students in our program and the fifth has a PhD in computer science. All are digital photograph enthusiasts. Participants were asked to provide digital copies of 20-30 images for the study. Participants were not compensated for the study.



**Figure 4.** Low-fidelity PhotoArcs created by our five participants: a) top left, b) top right, c) middle left, d) middle right, e) bottom two photos

#### *Method*

We chose to conduct our usability studies with a low-fidelity prototype of our interface in order to allow a richer set of interactions than those implemented in our coded prototype. Materials included a foam-core board, yarn and fabric in various colors, and print-outs of the digital images that the participant provided before the study. We also had scissors, tape, paper, and pens on hand and invited the participants to use them.

We focused exclusively on getting qualitative feedback from participants, since quantitative information such as the amount of time a task took was neither relevant for this interface (as long as the times are not exorbitant) or possible to test using a low-fidelity

prototype. We also took pictures of the participants' arcs as they created them (see Figure 4 for examples).

Because we believe that our interface should support *intuitive* interaction, we wanted to conduct our tests so that we could observe the ways in which participants intuitively interacted with their PhotoArcs. To do this, we let participants manipulate the interface components directly, only intervening when participants got stuck or veered far from our goals. We felt that our method would also allow us to observe what interactions the participants felt *were* most intuitive, rather than simply how they reacted to the interactions we had decided on. Though this technique did introduce a degree of uncertainty and variation, it did indeed provide us with valuable information on how well our design ideas supported intuitive interaction.

#### **Participant Responses and Alternate Interface Ideas**

Overall, user response was positive. All participants said that they would like to use the PhotoArcs system and, assuming that interaction was as seamless as they expected it to be in the low-fidelity prototype, they preferred it to current methods of online sharing.

All liked the idea of being able to create linear stories of events, and all liked the idea of an arc to represent a narrative and easily manipulated their low-fidelity arcs. Three participants wanted uploaded photographs to be automatically put on an arc, while two wanted a separate workspace. All wanted the chronological order of their photos to be preserved on upload. All also liked the ability to collapse and expand text, but wanted to add a title and a short description to an arc as well as to a picture.

Only one participant liked the idea of PhotoArcs intersecting each other at different points where they have photos in common (Figure 4a), which is the interface design we imagined. The other four participants felt that intersecting arcs could be confusing, preferring parallel arcs with photos that line up according to time (Figure 4b), a direction we will explore further in future work.

#### *Other Findings and Comments*

All participants wanted an overview view of a PhotoArc that provided a summarized version of the photos and captions. Some wanted information on the number of times a photo or arc has been viewed, similar to the statistics that Flickr keeps.

One participant wanted to use PhotoArcs as dramatic arcs that feature a starting point, conflict, climax, etc. For example, a PhotoArc could display a high point like a vacation as a peak, and a low point such as a bad family gathering as a dip. Another participant wanted to be able to create arcs by drawing a line between photos. He also wanted to be able to arrange arcs into distinctively-shaped "glyphs" that could help him identify arcs when zoomed out.

#### **Future Directions**

The first task for future work on this project will be to implement and test a working prototype of the PhotoArcs system, incorporating what we learned from the low-fidelity usability studies and integrating an existing photograph visualization in the background to assist users in adding photographs to arcs. After that, the PhotoArcs project could potentially go in many directions. Below we will outline the directions that most interest us.

- Privacy filters: let users create an arc specifically for one person and send it to them.
- Audio clips and/or integration of synchronous audio communication with recording.
- HistoryArcs can show one's browsing path through others' PhotoArcs or a photo site such as Flickr.
- Interactive, multi-author PhotoArcs.
- Automatic conversion to and from other photo-sharing formats such as photoblogs and online albums, and easy ways to switch between the various views.

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