

# SMILINGPHOTOS

## *Bridging the Gap between Digital Photo Albums and Printed Photo Books*

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**Abstract:** The number of photos has significantly increased in the recent years together with the problem of how to manage them: a picture can be printed as is, arranged into a more interesting photo book or shared through the web. Digital photos have the advantage that can be easily stored and shared with family and friends from different cities or countries but we must consider that many people do not even see the PC screen as a convenient vehicle for synchronously reviewing and sharing of photos with others. This paper presents a framework to bridge the gap between digital web albums and printed photo books. The idea is to allow the user to create, at the same time, a photo book for later printing, and a multimedia presentation to share with friends not only the taken pictures but the experiences they told. The paper presents *smilingPhotos* a tool for this double authoring: the user creates a multimedia slideshow which can be enriched with audio (music or spoken) comments, transition effects, animations and definition of the layout of the images. The result can be shared across the network, or automatically translated into a static photo book suitable for printing.

## 1 INTRODUCTION

Nowadays most people have a digital camera in their homes. This has brought to a significant increase in the number of pictures taken in recent years. However, the huge number of photos carries the problem of how to manage them: a picture can be printed as is, arranged into a more interesting photo book or shared through the web.

Even if the authoring of a photo book is still a complex and time consuming activity, the arrangement of favorite photos into albums is considered the best way to archive them (Frohlich et al., 2002; Frohlich et al., 2008). As an example, CeWe Color produced about 2.6 million photo books in 2008 and this production has increased of 57.8 % in the first five months of 2009 (CeWe Color Holding AG, 2009).

Digital photos have the advantage that can be easily stored and shared with family and friends from different cities or countries but we must consider that many people do not even see the PC screen as a convenient vehicle for synchronously reviewing and sharing of photos with others. Some studies (Frohlich et al., 2002; Frohlich et al., 2008) reported that some people do not have fun when looking at a picture in a screen but they want to point to things and com-

pare different pictures. For this reason digital photography has not completely replaced conventional photography: people usually prefer printed photos to archive most precious memories (birthdays, graduations, weddings, etc) while they must use web technologies as a vehicle for duplicating and distributing those memories to families and friends.

This paper presents a framework to bridge the gap between digital web albums and printed photo books. The idea is to allow the user to create, at the same time, a photo book for later printing, and a multimedia presentation to share with friends not only the taken pictures but the experiences they told. We implement a tool for this double authoring: the user creates a multimedia slideshow which can be enriched with audio (music or spoken) comments, transition effects, animations and definition of the layout of the images. The result can be shared across the network, or automatically translated into a static photo book suitable for printing. The multimedia presentation can take pictures from web albums shared in community like Google Picasa Web Album or Yahoo! Flickr.

The paper is organized as follows: Section 2 discusses the background and the related work. Section 3 presents *smilingPhotos* a tool which allows to create printed photo books and enriched multimedia pre-

sentations at the same time with just about the same effort of authoring a photo book for printing. A user study for the evaluation of the implemented tool is described in Section 4. We conclude in Section 5.

## 2 BACKGROUND AND RELATED WORK

Other works in literature consider the problem of authoring photo books. Sandhaus et al describe the process of photo book production as a complex activity divided in three phases: the capture phase, the author phase and print phase (Sandhaus et al., 2008). The authors identify the second phase as the most time consuming and annoying activity, hence applications that support the photo book author are needed. This problem has been deeply investigated in recent years. A partial solution is “Many for one” (Boll et al., 2007), a tool that allows the semi-automatic creation of photo books which pictures can be taken from the user computer or from other sources. The tool automatically arranges the photos into templates for printing. Moreover it enriches the photo book by inserting interesting related information (e.g. a text or pictures from a travel guide) from content of others, e.g. from web communities.

The experience of the user sharing photos through web communities has been studied in (Cunningham and Masoodian, 2007) and (Frohlich and Fennel, 2007). They both highlight that interacting with a web album must be more appealing to be really enjoyable for users. Despite Frohlich and Fennel agree with the rule “less is more”, since it is important to keep the interface simple to be usable, they suggest the possibility of including audio commentary as one of the key functionalities to be implemented to improve the sharing between users of experiences depicted in the photos. The idea is to create a virtual scenario in which a user shows some pictures to his/her friends and gives comments on them. This can be simulated by adding a synchronized spoken comment to a set of images.

Storytelling is another means of conveying personal experiences through digital photographs which shares the same scenario described above. In (Landry, 2008) the author notes that while new cameras have simplified the activity of capturing, producing compelling presentations using digital photos and other media is not less difficult due to current technologies, and argues the introduction of tenets of storytelling into software for common photo activities. He implements Storytellr, a system that integrates tasks of the storytelling process with photo activities like annotation and arrangements.

PhotoArcs (Ames and Manguy, 2006) is another system for storytelling which allows to add narratives to web photo albums. The photos are organized into linear arcs connected by text information. Different narratives may intersect creating multiple versions of a particular story. Even if the result is particularly appealing for the end users, it requires a relevant authoring activity.

Some works cope with the problem of non-existing connection between printed photos and their digital counterpart. Among these, (Henze and Boll, 2008) presents a system that uses a mobile’s phone camera to take a picture of a printed photo in a photo book. This image is sent to a server which is able to retrieve the corresponding photo and send it to the user. In order to recognize the correct photo, the authors developed image analysis techniques which are robust against scale, rotation and partial occlusion. They used an approach based on SIFT (Scale Invariant Feature Transform) algorithm which is also able to retrieve images captured with different lighting conditions. (Jin et al., 2004) describes a gesture-based interaction photo album (GIA) device that provides a natural interface since it simulates the turning of pages as in a printed photo book. GIA enhances the user experiences since it allows transitions and animations between pictures, and to interact with the photos (e. g. zoom in or out) through hand gestures. However the distribution of albums is restricted to the ownership of this device.

## 3 SMILINGPHOTOS: ENHANCED PHOTO BOOKS WITH SMIL TEMPLATES

Let us consider a scenario in which a group of friends gets together and shares some printed photos (usually organized into a photo book) and has fun discussing on it. Unfortunately printed photo book cannot be shared and distributed across the network therefore, later on, the photos are uploaded into a web album to be visible to friends that lived in other cities. However this second kind of users live a very different experience since they lack a set of important auxiliary information to understand the pictures: how the photo are collected usually respects their temporal and spatial relationships, and the spoken comment, which is very important, is completely missing.

A solution can be the creation of a slideshow of images synchronized with an audio comment, but since the users consider the authoring of a photo book a complex and time consuming activity they are un-

likely to make the effort to create also this kind of multimedia presentation as a completely separated job, using a different authoring tool requiring different skills, even if the result is a very involving experiences for remote users. On the other hand, presently, there is no way to author, at the same time with the same effort, a photo book and something else suitable for an efficient photos sharing.

Our work aims to partially solve this problem with *smilingPhotos*: the digital web albums are really poor in term of user experience, they usually allow only to view one photo at time and comment it with text. Moreover, our tool tries to find a solution to the lack of any connection between printed photos and its digital counterparts by combining the quite simple interface common to photo book authoring systems with the powerful of SMIL (Bulterman et al, 2008), a standard language developed by W3C to describe temporal and spatial specification a multimedia presentation.

### 3.1 The Prototype Implementation

*smilingPhotos* is a prototype authoring system which helps the simultaneous creation of printed photo books and rich multimedia presentations to improve photos sharing experience. We must note here that we do not aim at creating a complete authoring tool for photo books, since this kind of tool is very complex and requires a great number of features which are out of the scope of this work, but our goal is the implementation of a prototype which provides both the functions described above. However in order to keep the authoring activity simple, *smilingPhotos* does not require the knowledge of SMIL language, but imports a set of SMIL templates that are filled by user with drag and drop operations. Expert users may create new SMIL template or modify the existing ones.

*smilingPhotos* was implemented with the Java language and uses the XML language to save the user preferences and initial configurations. Figure 1 shows the user interface. The user can import pictures from the hard disk of her/his computer or from web communities. In particular the prototype system allows to import photos from Google Picasa Web Albums. In the same way, the final multimedia presentation can link photos from any web server or from Picasa Web Albums. The integration with other web communities are planned for the future. The imported photos are displayed on the left side of the user interface, the area marked by the letter “a” in Figure 1.

The user can choose the initial number of pages when she/he creates a new book. Initially all the pages share the same layout and are shown in the storyboard bar in the bottom (area marked by letter “c” in Figure

1). Then, the user can choose a page layout from the card with the label “Layout” ( marked by “d” in Figure 1). The user changes the layout templates by drag a layout and drop it over the page in the storyboard.

These template are written in SMIL and describe not only the spatial layout but also the temporal synchronization. The author disposes the pictures in the template by dragging and dropping them from the pictures preview panel: the result is shown in the right rectangular area of the user interface (marked by letter “b” in Figure 1). When the user saves the project, *smilingPhotos* creates a presentation in which photos are spatially arranged according to the chosen template for each page. The final user can navigate through pages by clicking on the right and left arrows, one to go to the next page, and one to go back to the previous page. These images are automatically created by the tool on the lower right and left corners. The “Preview” button starts the presentation.

The user can modify the temporal synchronization only by adding a duration to pages. This means that each page, in absence of user interactions, is displayed on the user screen for a predefined time interval. Then, the next page is played. This choice is due with the purpose to keep the authoring activity simple: the photo book must be done without requiring any particular knowledge to the user. Modifications to the time line of the multimedia presentation can be done by expert user who can manually modify the SMIL templates or add new ones.

These simple steps, importing the photos, choosing templates and filling them with drag and drop operations, are similar to many other photo book authoring tools and produce as output a photo book suitable for printing. Many tools for photo book authoring use XML templates. The choice of SMIL templates instead of other solutions, brings the side-effects that the produced result contains also some timing relationships, transition effects and animations defined in the templates. Let us consider the case in which the same spatial layout is used both to print a page and to display images into a multimedia presentation by moving them in the screen, one at a time, till they reach the desired position. We can say that, in same sense, the author designs the photo book for printing, and gets back also the multimedia presentation. This double result helps to pay the user back for the complexity of the authoring activity: hence *smilingPhotos* try to solve one of the key problem of photo books production discussed in the introduction.

Let us consider, as an example, a photo book like the one depicted in Figure 1. The book is limited to 6 pages, but the author can add new pages by clicking the right button mouse on the bar at the bottom.

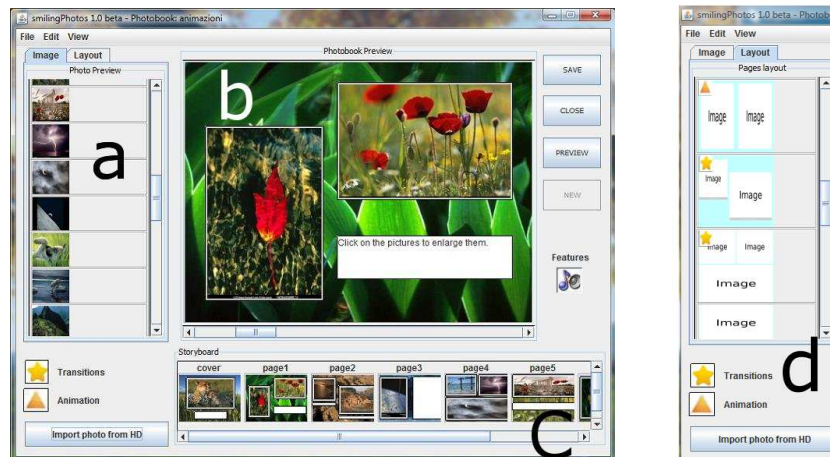


Figure 1: User interface of the prototype *smilingPhotos*. The “Layout” panel (d) is hidden under the pictures preview panel.

If the user saves the book, *smilingPhotos* creates two files: a SMIL file describing the resulting multimedia presentation and an XML file describing the structure of the document without the temporal information. This second file is used to re-open the book for further elaboration, e. g., to print it. We must say that a standard format for printing does not exist, but each photo printing service defines its own format, usually using XML language. For this reason, *smilingPhotos* does not export a particular format, but the use of XML languages (SMIL is an XML language too) allows for the easy translation to any existing format by defining an appropriate XSLT transformation.

At this stage, the resulting presentation is similar to what can be obtained with applications provided by many printing service, which allow to review on-line the photo book before printing: the pictures are arranged in spatial template and the user can flip through the book pages. The use of SMIL allows to add animations and translation to pages. As an example, pictures can enter from outside the screen and the flip through the pages can be associated to transitions like fade, or something more complicated like clock-wise or barwise transitions. Moreover, the user may enlarge a picture by clicking on it. All these behaviors are achieved without user intervention, she/he has only to choose a template: in the layout panel, layouts which contain transitions or animations are marked, respectively, by a star or a triangle (see Figure 1(d)).

*SmilingPhotos* requires two additional steps to enrich the final multimedia presentation: the author can

- add a duration to each page, defined in seconds by clicking the right button mouse over the page on the storyboard, so that the final user can watch a presentation that automatically flips the pages after a predefined time interval and

- add an audio comment synchronized to the entire presentation, e. g. a music jingle, or to each single page, e. g. a voice that comments each picture displayed in that page to virtually re-create the situation in which a set of co-located friends listens to the picture owner who comments the photo book.

Once the authoring activity is finished and the author decides to save the enhanced photo book, the tool fills all the templates with the references to actual media items and collects them into a single SMIL file. Then, the photo book can be translated into a proprietary format to be sent to a printing service, or the author can share the multimedia presentation through the web. In this case, it is sufficient to upload the SMIL document and the audio files (when needed) to a web site. The photos must be uploaded only if they are not already shared into a Picasa Web Album.

The SMIL document needs a suitable player for rendering. Our tool uses the third version of the standard, the last one defined, therefore, at the moment, the only available player is Ambulant Player (Ambulant Open SMIL Player, 2009). This player is available *freeware* for all operating systems as a stand alone application, or as a plug-in for the Mozilla Firefox and Apple Safari web browsers. Therefore at the moment, the multimedia presentation can be played as a stand alone application with Ambulant player in any operating system, but is accessible on the web only with Firefox and Safari. This limitation is due to the availability of the Ambulant plug-in for these browsers. We think that future implementations of the standard will overcome this limitation. To the best of our knowledge, other browsers (e. g. Microsoft Internet Explorer) currently support some modules of the standard and plan to extend this support to a bigger subset of SMIL tags and attributes. Moreover, there

are JavaScript implementations of some SMIL modules (e. g. JavaScript implementation of `smilText` is available in the web page of the *Ambulant Player*) which make documents, using that modules, accessible with any browser.

## 4 USER STUDY

The prototype implementation of *smilingPhotos* has been tested also with a user study in which a set of 10 users, from 20 to 40 years old, evaluate the tool and give feedbacks. The user study allows us to evaluate the tool, but also its suitability to the target audience and the possible impact on the users' choice among different printing services and web communities for photo sharing. The goal was to assess the interest of potential users in adding sound comments, animations and transitions to standard photo books and the degree of user-friendliness of the system.

The users were asked to create a photobook with the tool and to answer to a questionnaire of 15 questions. The questions consist on multiple choice questions on the user degree of expertise in using applications for photo book editing and photo sharing, their interest in the final presentation and the quality of the experience made with *smilingPhotos*. The users rate the answers on a scale from 0 to 5. At the end they have the possibility to express additional remarks.

The majority of users declare they had used at least once a program for authoring photo books (60%) but their degree of expertise is rather low (on average, 1.4). Almost all the participants (90%) have used an application for photo sharing on the web, they declared to use it quite frequently and their degree of expertise is high.

Before starting the evaluation, the aims of the tool, how it works, and the goal of the user study are explained to the participants. For this test, the users run *smilingPhotos* in a notebook in which they could find also a folder with pictures, music and audio effects which they could select for the creation of the photo book. During all the authoring activity, the user could refer to a text guide if they needed it. The user could also play two multimedia presentations, both created with *smilingPhotos*, an example, and an enriched user guide. The second one, a photo book in which each page shows a different functionality of the tool with screen shots and audio comments, had both the goal to help the user in his/her activity, and to show a possible output of the software they were testing.

The questionnaires revealed the following insights. The interest of users in the possibility to add animations, transition effects and music to their

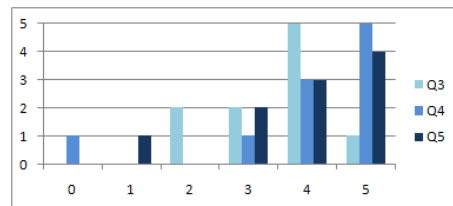


Figure 2: Answer to question 3, 4 and 5 of the questionnaire.

shared photos is, on average, high (mean 3.5, standard deviation 0.97). In Figure 2, the answer to this question are labeled by “Q3”. The users declared also an higher interest (mean 4, most frequent value 5) in the possibility to have an enriched multimedia slideshow as a digital counterpart to the printed photo book: only two participant declared an interest lower than 4 (see Figure 2, series “Q4”). In the same way, they declare an even higher interest in the possibility to obtain both the photo book for printing and the enriched slideshow for web sharing with the same application (mean 3.9, most frequent value 5) as shown by series “Q5” in the figure.

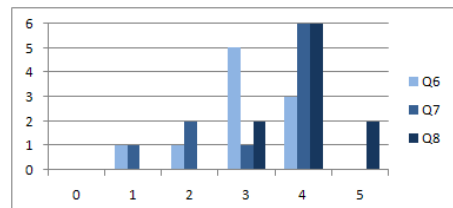


Figure 3: Answer to question 6, 7 and 8 of the questionnaire.

The user reported a good experience in using *smilingPhotos* rated, on average, to 3 (series “Q6” in Figure 3). The quality of the final output, i. e., both the photo book for printing and the multimedia presentation, is also good (mean 3.2, most frequent value 4): only three participants evaluate it less than 3 as reported in Figure 3 by series “Q7”. Users have highly evaluated the relationship between the quality of the result and the effort to get it (mean 4, standard deviation 0.4, complete distribution depicted by series “Q8”). Some users reported in the additional remarks that they highly appreciated the simplicity of the tool: they experienced other softwares that are able to give better output, but the effort to understand how they work had prevented them from using.

Finally, the user study highlighted that the availability of tool like *smilingPhotos* can influence the user choice among printing service and web sharing applications. The participants to the study stated that this influence is considerable and is higher for printing services (mean 3.4) than for web sharing applica-

tions (mean 2.8).

## 5 CONCLUSIONS

In this paper we presented *smilingPhoto*, a prototype authoring tool for the creation of enhanced photo books, i. e. photo books suitable both for printing, to archive most precious memories, and for sharing photos (and experiences) through the web. The goal is to enhance the experiences of remote users, without asking too much additional effort in the authoring activity. *smilingPhoto* allows to choose a page template and fill it with drag and drop operations. Moreover, it can add music or spoken comment to a single page or to the whole photo book. Picture can be imported from web communities, like Google Picasa.

Beside the printed photo book, *smilingPhoto* produces as output also a multimedia presentation, described using SMIL, which can be uploaded to a web server. In this way, our tool tries to fill the gap between a printed photo and its digital counterpart.

A user study has been conducted to test and evaluate the system: it shows that the participants are highly interested in the possibility to obtain also a multimedia presentation as result of the creation of a photo book for printing. Moreover, they really appreciate the ratio between the quality of the obtained output and the effort required to get it.

Many other authoring system for printed photo book have been implemented in recent years, but they usually focus only on printing and do not allow to share the books or the quality of their digital counterpart is very poor (e. g. they do not allow transitions or animations, and the user interaction is limited to the flip of pages.). Apple iPhoto (Apple Inc., 2009) requires some discussion. It is an authoring system, available only for Apple platform, which allows the creation of photo book which can also be shared. As the majority of photo book authoring systems it is based on layout templates, but it is possible to add music and some templates contain transition effects. Differently from our approach, the digital albums cannot be shared in web pages<sup>1</sup> but only through iPhone or iPod. *smilingPhoto* does not impose any platform, operating system or device, and the use of the standard SMIL opens the possibility, in the future, to play the presentation in all browsers. Finally, some participants to the user study declared that, even if *smilingPhoto* is not comparable to iPhoto in term of implemented functionalities, they prefer our tool for its

<sup>1</sup>Single images or gallery can be shared through web pages

simplicity of use, since the learning time needed for iPhoto is considerably too high.

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