

mAMP: Adding Peripheral Photo Browsing to the Music Listening Experience

ABSTRACT

We present the ----- Ambient Memory Player (mAMP), a digital music player that ambiently displays photos related to music that a user is playing. mAMP combines music listening and photo browsing while still maintaining the lightweight nature of the former activity. We discuss the results of a two-week user study and describe how mAMP enhances the reminiscing experience and can serve as a catalyst for initiating a communication session by phone, IM, or in-person. We also describe how mAMP can allow for a serendipitous experience in the discovery and browsing of new photos. These results demonstrate the value of applications that make explicit links between similar metadata attributes across different media forms. We conclude with a list of design suggestions to guide future efforts in building this type of application.

Author Keywords

Music, Photo, Metadata, Peripheral Display.

ACM Classification Keywords

H5.1. [Information Interfaces and Presentation]: Multimedia Information Systems.

INTRODUCTION AND PREVIOUS WORK

As media begin to be tagged with rich metadata, new and interesting connections can be made between different types of content. For example, textual metadata can allow for connections between media types. Consider the tag, “Chicago”. The content of a photo can be the Chicago skyline, a song could be recorded by the musical group Chicago, the title of a film could be “Chicago”, and the setting for a TV show could be the city of Chicago. While some metadata attributes are generally media-specific, some attributes are common across various media. For

example, all content could be tagged with the time of capture, time of viewing/listening, and location of capture/viewing. These tags would allow systems to make rich connections about media that users put together or experienced together, creating a multimedia sense of what a user experienced at a particular event.

Several researchers have developed systems that take advantage of these metadata links across media. This class of systems can use the metadata of one media type to either retrieve or create an artifact of a different media type. For example, Beyond Broadcast [5] uses a news broadcast to generate an information space in the form of a webpage. The user can then browse the webpage to obtain more detailed information about the current news broadcast. The Web2TV system [6] uses a mapping in the opposite direction, fusing static web content with character agent animation. This enables users to watch web content the same way they watch a TV program.

This work continues the exploration of this rich design space by examining the link between music and photos. Our choice in focusing on these two media types is grounded in the findings of two ethnographic-style studies investigating consumer use of photos and music, respectively. Bentley et al. [1] discovered that many of the social practices around photo reminiscing also apply to music listening. They further propose the idea of “experience packages”, a binding together of music and pictures to create stronger memories of past events and support richer storytelling. The two media can be linked by the time-based metadata that the two media types share. Most digital photos contain a header with information about the date and time of capture. Photos can also be annotated with the times that they were viewed. A date in the metadata for a music file could represent when the song was recorded, when it was added to the owner’s music library, or when it was last played.

One common social practice described in [1] is the use of photos and music as vehicles for event-based storytelling, as participants would consistently mention stories about times in their lives that revolved around their music. They found that music reminded listeners of times they had listened to it before. Motivated by the way music tended to evoke mental images of people and events, we focus on providing technological support for this rich reminiscing



Figure 1 The mAMP system consists of a Photo Viewer (left) and a digital music player (right).

experience by building a system that ambiently displays photos while a user is listening to music.

Inspired by this previous work and designed as a concept application making use of existing temporal metadata links across media, The Ambient Memory Player (mAMP) is a digital music player (Figure 1) that uses the time-based metadata links between photos and music to create “experience packages” by retrieving and displaying relevant photos to the user while she is listening to music. These photos may come from the user’s own collection, the collection of his/her friends, or from the Flickr community.

In the summer of 2006, we conducted a two-week long field trial of mAMP with six residents of the Chicago metropolitan area. (4 female, 2 male, age range: 20 to 44) We hypothesized that the users would be able to have richer remembering and reminiscing experiences when listening to music and viewing a photo that share a time-based connection. In addition, we hypothesized that this “replaying” of memories by mAMP would serve as a catalyst for starting a communication session by phone, instant messaging (IM) or face-to-face. Finally, we wanted to observe the effect of augmenting the music listening experience with a glanceable photo, checking to see if the peripheral nature of music listening is preserved.

IMPLEMENTATION

Brainstorming and feedback from a lo-fi prototyping suggestion led us to implement mAMP as a plug-in to a user’s desktop music player (as opposed to it being an independent application). mAMP is implemented as an extension to the jLGui music player [6]—an open-source desktop digital music player. In the setup phase, the user’s entire photo and MP3 collection are tagged with metadata and stored in the Metadata Services Engine (MSE) [4]. Once a song is playing, jLGui communicates with the MSE to retrieve a photo tagged with attribute values similar to that of the currently playing song using one of the following methods:

- Add Date: Look for a photo with a capture date close to when the MP3 file was added to the music library

- Creation Date: Look for a photo with a capture date close to when the MP3 file was created
- Artist name: Search Flickr for photos tagged with the artist name or containing the artist name in the description
- Song title: Search Flickr for photos tagged with the song title or containing the song title in the description

Due to the limited and often missing or incomplete metadata provided in an MP3’s ID3 tags, the photo retrieval methods described above are relatively naïve. Although these connections often proved meaningful as seen below, we propose more sophisticated retrieval methods taking advantage of richer usage history data and more complete song information in the Future Work section.

Once a photo has been retrieved, it is shown in the Photo Viewer (Figure 1, left) for the duration of the song. Several interactions are possible through the Photo Viewer, motivated by early-stage design feedback where users wished to have the option to interact with the viewer window to browse other related photos. Clicking on the photo yields different results depending on its ownership. If the user is the owner, the default image viewer is opened with the image in its original size. Otherwise, the default web browser is opened to the Flickr album from which the photo came. From there, the user can browse other photos in the same album. Information displayed in the title bar of the Photo Viewer is also dependent on the photo’s ownership. If the owner is an IM “buddy” from the user’s buddy list, an icon representing their IM presence status is shown in the top left corner and the owner’s screenname is mentioned in the title bar. In Figure 1, mAMP informs the user that the image is from “aedg01”, who is currently online. When the currently playing song ends and a new one begins, the process is repeated and a new photo appears in the window.

EVALUATION

We designed a two-week long study with six residents of the Chicago metropolitan area to test the hypotheses described earlier. Each participant was asked to use mAMP as their sole music player for the duration of the study. At night, each participant called a toll-free number and left a semi-structured voice-mail journal entry discussing overall reactions to mAMP and specific instances of reminiscing and communicating which happened as a result of a photo viewed or song played. At the end of the study, the participants were interviewed for approximately 45 minutes about their reminiscing and communication experiences with mAMP, reactions to the photos viewed, and how the application fit into their daily routine, if at all.

Most of the data for analysis was in the form of recordings of interviews and voice-mail journal entries. Relevant portions of these recordings were transcribed and divided into “items: events, behaviors, statements, or activities”,

borrowing from an approach to content analysis described in [8]. After the items were divided into groups based on the research questions to which they applied, inductive analysis similar to that described in [1] was used to identify themes in the data and, in turn, answers to the research questions.

Findings

In this section, we describe how mAMP use provided participants with rich remembering and reminiscing experiences, prompted them to start communication sessions, and allowed them to serendipitously discover and appreciate photos from outside their own photo collection. Even with the addition of a photo, the mAMP photo-viewing/music-listening experience still remained a background activity. Participants were able to perform other tasks while the application was running.

Reminiscing and Communicating. The most common scenario described by the participants is where a song and relevant personal photo will prompt a rich reminiscing experience and sometimes a communication session by phone, IM, or face-to-face. While listening to a song by Weezer, Patty¹ saw a photo from a Weezer concert. She says: "...That reminded me of this concert that I went to last year with my friend...I hadn't talked to him for a while so I decided to call him up today--like right after I saw it..." When asked if she would have called her friend if she was just listening to music, she said, "I don't think so. I have a lot of Weezer on my iPod...the Big 'W' sign [really did it]." The addition of a relevant photo to the currently playing song enriched the reminiscing experience, prompting a communication session with someone Patty had not contacted in some time.

Curiosity and Playfulness. All of the participants admitted in varying degrees being curious about some of the photos displayed in mAMP, particularly photos not personally owned. This curiosity often led to the participant clicking on the photo and browsing a photo album on Flickr. The reasons for photo browsing varied (e.g., artistic qualities of the photo, content of the photo, seeing the photo in the context of the currently playing song) but the effect was generally the participant's serendipitous discovery of interesting photos. Sometimes, curiosity led to a sense of "play" when the connection between the song and photo was not obvious. Linus described it like a game where one attempts to justify mAMP's decision to make a particular song/photo association: "You try to create a little story in your head or try to connect the dots in some weird abstract way."

Introspective Thinking in mAMP. Over time, users of mAMP are exposed to photos from their own collection, the collection of their friends, and from the general Flickr population. On some occasions, this led to moments of

introspective thinking and moments where the participants were able to make inferences on their own media collections. One such inference resulted in a photo browsing experience as Patty recalls: "I was looking at her photos [saved on my computer] and I was like 'Wow! I have a lot of photos that I didn't realize I had!' So then I started going through ALL of my photos." In several instances, mAMP helped the participant "rediscover" photos from their own collection and the memories associated with them.

During the study, there were a few instances where mAMP use led to an introspective moment and then a realization about neither photos nor music. After seeing an amusing photo of a man in a Styrofoam hat, Marcie realized: "I haven't been having as much fun as I should be lately." After browsing a photo album on Flickr, Patty realized: "It [browsing a particular album on Flickr] kinda revealed my desire to be artsy, I guess...Like I kinda wish I could capture photos like that."

Peripherality of mAMP. None of the participants found the images displayed in the photo window to be distracting. Depending on the level of attention demanded by the participant's primary task, he/she could easily modify how much attention to give to the photo window. Charlie enjoyed the glanceable nature of mAMP so much that he would have it on even when he wasn't listening to music and compared the application to a "digital picture frame".

Song changes would sometimes serve as a cue to glance at the photo window. Linus said: "If I'm conscious that there's a song change about to happen then I'll kinda stop what I'm doing and for curiosity's sake, I'll click on the picture window to see where it's gonna go next." Participants would not check the photo window after every song change but when it was appropriate for the primary task at hand.

Overall, feedback from the participants suggests that mAMP does not take away the peripheral nature of the music listening experience. As a result, the participants were able to complete other computer- and non-computer-related tasks while using mAMP. Linus said: "I barely ever just used [mAMP] just on its own. I almost always used it in conjunction with something. Even if I wasn't sitting in front of the computer, I would still have it running ..."

DISCUSSION

As mentioned earlier, mAMP is a concept application to investigate the value of applications which take advantage of shared metadata attributes across different media types. In building and evaluating mAMP, we present the following design suggestions to consider when building other applications in this space, motivated by our own experiences:

Derive the media mapping from naturalistic scenarios. Participants in the study felt that the concept of showing relevant photos during a music listening experience is novel and interesting but not a difficult one to grasp. We feel this

¹ All participant names are pseudonyms

is because there is already an inherent connection between photos and music as discovered in [1] where music listening triggers a mental image. Similarly, Beyond Broadcast was designed to support the familiar scenario where one is listening to a news broadcast but would like to access more breadth, depth, or points of view than the original broadcast provides. Selecting a mapping that is grounded in natural scenarios contributes to making the system intuitive and easy to learn.

Handle metadata mismatches gracefully. Systems leveraging off of temporal links in metadata should expect instances where a match is unlikely to occur and handle this instance gracefully. For example, if a Beatles song from 1964 is playing, mAMP will most likely not find a digital photo taken in 1964 in the user's collection. We handle this case by having the system search for a photo based on the song title or album name instead. Alternatively, the user can directly change the "date" metadata associated with the song to a year when the song became relevant to him/her. In general, there may be cases where the metadata link is weak or nonexistent for media of a certain size, time, or in a certain location. Anticipating this and planning for the empty search result will make the resulting system more robust.

Intersperse personal and shared data in media retrieval. As described in the findings, participants in the study found value both in revisiting photos from their own collection and discovering shared photos from a friend or stranger's collection. In fact, some participants found the discovery of new photos more appealing because they already had a mental account of the photos in their own collection. Mixing between "revisiting" and "discovery" in the retrieved media also lessens the occurrence of repeated media matches. In an earlier iteration of mAMP, the same personal photo would appear each time a certain song was played. This occurred to a much lesser degree in the study with the introduction of searching by song/album title instead of by year which often returned shared public photos.

CONCLUSION AND FUTURE WORK

In this paper, we presented the ----- Ambient Memory Player (mAMP), a digital music player that uses the metadata of the currently playing song to retrieve and display a photo tagged with similar metadata. The results of a two-week study suggest that the addition of a glanceable photo that is relevant to the currently playing song often had a positive effect on the music listening experience. The time-based connection between the song and the photo can prompt a rich remembering or reminiscing experience. As a result of this experience, users often initiate communication sessions by phone, IM, or face-to-face. Additionally, the photo can prompt browsing of personal or shared photo collections. Both of these effects contribute to a serendipitous discovery of new photos and new insights

about him/herself and people within the user's social network. From our experiences we present a short list of issues to consider when designing applications similar in nature to mAMP. Addressing these issues is likely to impact the usability and utility of such systems.

Future work can occur in two directions: improving the song/photo matching algorithm, and studying other applications in the multiple media space. While some of these ideas were formulated before the field study, feedback from the participants of the field study served as positive support for them.

Attaching richer metadata to songs and photos will improve the relevance of photos retrieved by our current song/photo matching algorithms. In addition, it will allow us to develop new matching algorithms. For example, the two current methods of associating a time with a song (date added to library and date recorded) did not always accurately describe when a song was relevant to the user. Associating a "date often accessed" time to a song may serve as another indicator of relevance. For instance, if there was a certain week or month where a user listened to a song more often than other songs, that time might be a more accurate relevance date than date added or recorded.

We also hope to continue exploring the space of applications that make explicit metadata links across different media. In interviews, several participants mentioned an interest in seeing relevant videos or web pages in addition to photos while a song is playing. This suggests mapping from music to other media may be interesting to users. In addition, media mappings starting and ending with data other than music and photos are also possible. The suggestions presented in the Discussion are intended to assist future efforts made by others in exploring this rich application space.

REFERENCES

1. Bentley, F., Metcalf, C., and Harboe, G. Personal vs. commercial content: the similarities between consumer use of photos and music. In Proc. CHI 2006, p.667-676.
2. Gandhi, B., Martinez, A., Bentley, F. Intelligent multimedia content management on mobile devices. In Proc. ICME 2004, p. 1703-1706.
3. jIGui. <http://www.javazoom.net/jlgui/jlgui.html>.
4. LeCompte, M. and Schensul, J. Designing and Conducting Ethnographic Research. Walnut Creek, CA: Altamira Press, 1999.
5. Livingston, K., Dredze, M., Hammond, K., Birnbaum, L. Beyond Broadcast. In Proc. IUI 2003, p. 260-262.
6. Nadamoto, A. and Tanaka, K. Complementing your TV-viewing by web content automatically-transformed into TV-program-type content. In Proc. MULTIMEDIA '05, p. 41-50.

Contribution/Benefit Statement

Describes a digital music player that ambiently displays photos related to music currently playing. Demonstrates the value of applications that make links between similar metadata attributes across different media forms.