Frame of Mind: Using Storytelling for Speech-Based Clustering of Family Pictures

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ABSTRACT

Mobile technologies, like tablets, allow complete family picture collections to be accessed from anywhere on a single, portable device, but still do not support browsing and reminiscing from family pictures as one would from an album. This is especially a problem for older adults who are more motivated to share their memories, but often have less access to their physical pictures due smaller living spaces. Frame of Mind offers simple tablet interactions for family picture reminiscence. The app uses the implicit speech interaction of oral storytelling to automatically organize pictures into album-like sets from the prompted memories. Users can modify and filter the sets, but do not need to manually sort and organize their pictures. This simplifies the overall process of family picture interactions by leveraging one enjoyable aspect to automate a more effortful one.

Author Keywords

Digital storytelling; older adults; implicit speech interaction; explainable interactions;

ACM Classification Keywords

H.5.2 [Information Interfaces and Presentation]: User Interfaces; I.2.7 [Artificial Intelligence]: Natural Language Processing

INTRODUCTION

Family pictures and photo albums allow families to browse through their memories and reminisce, prompted by the different pictures in front of them. This kind of casual storytelling is important to maintain, but the time and effort required to keep up with maintaining these collections is too much [2].

With the increased availability of cloud storage, entire collections of family pictures are shared and stored digitally. Smartphones or tablets have become the norm for picture access, and these digital spaces can expand the possibilities for picture storage beyond simple albums, for example by leveraging the implicit speech interaction of oral storytelling.

Unfortunately, technologies for picture viewing do not yet support the basic activities of browsing and reminiscing as paper-based photo albums do. This lack of digital tool for reminiscence limits how families can share their pictures and memories. This is especially true for older adults, as they are more motivated to share their stories [3], but are often excluded as these activities move to be only available digitally and have less access to their pictures as they move into smaller living spaces.

Older adults, and families generally, require a lightweight, portable, and accessible digital tool to browse through pictures and reminisce together. Such a tool should also ease the work of picture organization and memory documentation in ways that are understood and controlled by users, so they remain the narrators of their own memories. Frame of Mind (figure 1) provides this space for simple browsing and reminiscing, as is done with paper pictures now [1]. Pictures are organized based on the different memories prompted and what they have in common to form more robust, customizable versions of traditional paper albums. This transparent clustering of pictures eases the work required and organizes pictures based on the memories they prompt, creating a rich picture space designed for the simple, enjoyable activities that preserve family history.

SHARING MEMORIES

Frame of Mind is a universal Windows app based around the metaphor of a shuffled set of pictures spread out on a table top, creating a space for easy, unstructured storytelling (figure 2). The design of this tool was developed through a Contextual Inquiry of older adults with their picture collections, and then with those same pictures on a prototype
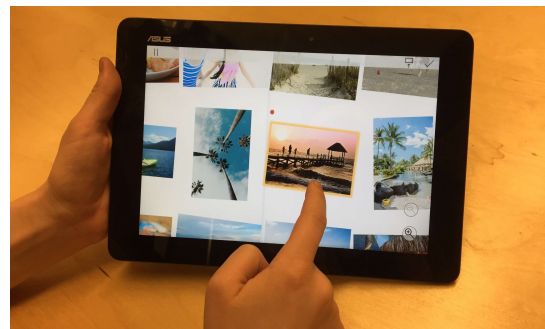
Figure 1. Using Frame of Mind for family picture reminiscence.
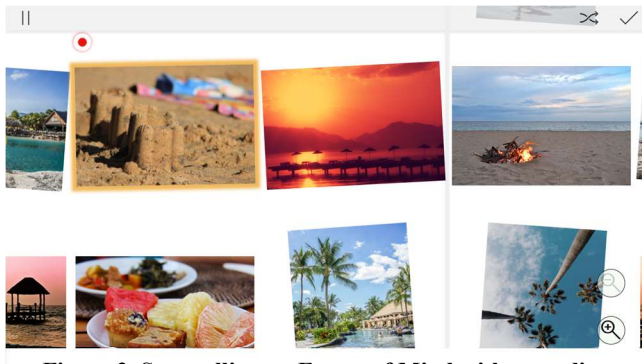
Figure 2. Storytelling on Frame of Mind with recording indicator on selected picture.

of Frame of Mind. The design findings of these include supporting free-flowing movement between pictures and reminiscence through oral storytelling supported by touch.

ORGANIZING PICTURES BY REMINISCENCE

As memories are shared in Frame of Mind, pictures are selected in turn and the storytelling is recorded. That speech is associated with each included picture by their timestamps. As more stories are told over time, each picture gains a set of automatically-transcribed speech that prompted it, and this implicit speech interaction builds an understanding of each picture and how it relates to the whole collection.

Clustering Picture Speech into Sets

The transcribed speech for each picture is transformed into a tf.idf vector (term frequency, inverse document frequency), a simple tool to understand relationships between documents (bodies of text) based on what terms or words are used across the various documents and how. These vectors are then clustered using a Bayesian estimation of a Gaussian Mixture Model to create sets of pictures from their memories.
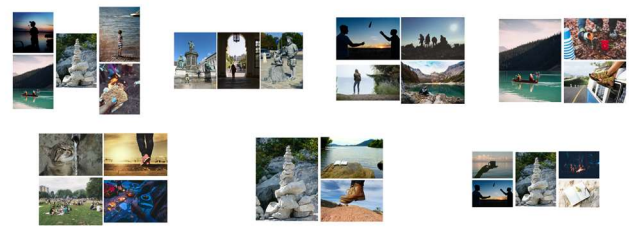
Interaction with Picture Sets

The centre-most pictures in each set are used to represent each set as framed pictures on a wall (figure 3). This is based on our observations of participants' representative pictures prominently displayed on walls. Selecting one of these loads that set onto a table top.

Users can control how the sets are clustered and presented through user-friendly controls specific to the needs of picture organization, such as how closely related pictures in a set are. Sets can also be modified by picture metadata, such as by showing only sets with pictures discussed recently or vice versa. With this, families no longer need to manually sort and organize their pictures, but can easily browse and reminisce.

FRAME OF MIND DEMO

In this demo, conference attendees will be able to interact with a fully-functional Frame of Mind app and explore its capabilities for storytelling and organization. The Frame of Mind tablet app development is stable and the app has been tested with more than 100 users up to date. The IUI 2018 proposed demo will showcase new capabilities for supporting digital picture browsing and reminiscence, such as the use of speech-based automatic picture clustering. The

Figure 3. Example tiles for Frame of Mind sets using the framed pictures metaphor. Each tile represents a picture set that can be viewed on the table top.

app will be pre-loaded with speech data on stock photos so that attendees can interact with some sets immediately. Attendees will also experience how the sets can be viewed and manipulated through storytelling and direct interaction.

FUTURE WORK AND CONCLUSION

Since the clustering is based on the speech from each picture, effective clustering requires some speech for each picture, and the system naturally becomes more robust as a family shares more memories. When first used, however, there will be no speech associated with any picture. We expect that Frame of Mind will initially inherit the existing picture organization (e.g., one set for each physical album or digital folder) or may organize by metadata (e.g., date or location).

This work is a first step towards supporting automated picture organization by memory that will need to be assessed in a formal study, and target users will be consulted on the interaction design. There are also planned improvements, including allowing a user to provide feedback on a set and to find sets that are similar or dissimilar to a given set.

Frame of Mind offers interactions for digital reminiscing and viewing pictures and further supports browsing and automatic organization of collections. Leveraging implicit speech interactions with family pictures to simplify the process of managing pictures is a significant step to bettering digital picture interactions. Families do not need to be burdened by that work and can more directly engage in reminiscence activities. For older adults, providing these interactions in one simple tool, like Frame of Mind, means they do not need to limit their access to their pictures and can easily continue to reminiscence from them.

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