

# Long-term Memory Retention and Recall of Collected Personal Memories

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**Figure 1:** Left side: the automatically selected photo first turned into a memory cue by blurring the subject's face. Right side: the blurred image is presented to the user to facilitate active review by guessing who is in the picture before revealing the original photo.

## 1 Introduction

To remember important information, we often take pictures and arrange them into collections. Photos can also be gathered and organized via personal lifelogs and social media websites which may include contextual metadata such as location, participants, rating, and even emotional tags. However, memories and connections between places, events, and people can be difficult to recollect. Memory recall in our brain can depend on several factors: emotional level, context variability, loss of information during encoding, etc. As time passes, memories are gradually forgotten or become altered, e.g. due to collision with newly encoded information [Yi Chen 2010].

Spaced repetition is a learning technique that reviews learning material in increasing intervals of time. It has been shown to enhance retention rate of information over a longer span of time (see e.g. [Kornell 2009]). As such, it can be used to potentially boost long-term memory retention of collected personal memories.

## 2 Our Approach

A novel photo view and review personal information system is proposed to increase retention and recall of collected memories by utilizing the spacing effect in learning and presenting a context-aware selection of photos as the “learning material.” The primary aim is to improve memory connections by automatically creating “visual photo journeys” around the following themes:

- Events. Events can consist of multiple sub-events and multiple participants or be around the same location. For example, a trip to Thailand may be comprised of several meals, day trips to the beach and forest, and with several people involved.
- People. Our feelings regarding people in our lives are often drawn from shared experiences. By linking an image series for a person with experiences over varying periods of time and varying places, we can increase the connectivity associated with that person in our mind.

Each visual journey contains a collection of pictures, in which photos are selected in connection to the chosen event or person. The

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available metadata is utilized to discover relations between photos and vary the composition of journeys to increase the number of memory cues, thus stimulating retention and recall of personal memories. Review times are scheduled for visual journeys. For effective learning, photos are turned into memory cues by blurring or hiding parts of the image. Transformations are done automatically, e.g. by relying on the automatic face detection feature common in photo album applications and blurring the corresponding area. This prompts the user to actively think before the original, unmodified photo is displayed. In general when using a spaced repetition system, the success of recall from retrieval cues is evaluated through user rating and used for scheduling subsequent review times. This would mean that the user devotes some time of the day to actively review scheduled parts of visual journeys. While this may be acceptable for a group of users, we are also considering a passive, background review mode where user evaluation is optional. The system would assign ratings based on the user's physiological signals, such as heart rate, and utilizing gaze tracking to confirm the user's target of attention. Our system hopes to invoke a “curiosity effect,” through which a user will naturally be curious as to “what picture will be next,” forcing them to relate what they have seen with other memories. Complementary to still photos, audio clips, music, and video media may also be used as memory stimuli.

The system could be applied to mobile phones, laptops & desktop computers, digital picture frames, and TV gaming and media systems, including online social media. Such devices and services can then be linked to a single database via a computer network.

## 3 Further possible applications

Memory triggering also has other functions in daily life. Due to the emotion-arousing ability of memories, it also becomes possible to trigger moods, e.g. to attain a positive effect from certain triggers such as inspirational photos capturing moments when one may have performed his or her personal best.

## References

- KORNELL, N. 2009. Optimising Learning Using Flashcards: Spacing Is More Effective Than Cramming. *Applied Cognitive Psychology* 1317, January, 1297–1317.
- YI CHEN, G. J. J. 2010. Augmenting human memory using personal lifelogs. In *Proc. First Augmented Human Int. Conf.*