MyLife: An Online Personal Memory Album

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***Abstract*—In this demo, we illustrate the formation, retrieval, and playback of autobiographical memory in an online personal memory album named MyLife. The memory in MyLife consists of pictorial snapshots of one's life together with the associated context, namely time, location, people, activity, imagery, and emotion. MyLife allows direct import of memories from other online personal photo repositories. For memory retrieval, users can use not only exact cues, but also partial, vague, inaccurate, and random ones. The retrieved memories are then played back as a movie-like slide show with various visual effects and background music. MyLife holds high potential in both research and daily usage. In particular, it provides the sense of nostalgia to the elderly users and thus may help to improve their psychological health and well-being.**

I. Introduction

It is estimated that in 2014 alone, there are 880 billion digital photos taken in the world. Facebook, the famous Social Network Service (SNS) platform, receives averagely more than 250 million photo uploads per day during the last quarter of 2011. How to efficiently store and retrieve personal photos presents vast challenges. Many online repositories organize the photos based on the timeline and many only support retrieval by exact matches on the provided keywords (few such as Facebook support semantic search). In this demo, we present MyLife, an online personal album for the storage, retrieval, and playback of autobiographical memory. Each episode of memory consists of a series of events and each event consists of 5W1H, representing when, where, who, what, which, and how. Users can either directly upload each piece of memory to MyLife or import from other online photo repositories. MyLife supports various types of cues, namely exact, partial, vague, inaccurate, and random. The retrieved memories are ordered based on the provided cues and played back in that sequence. MyLife presents an innovative way for storing and retrieving memory and would potentially benefit numerous people. In particular, memory playback is good for the psychological health and well-being of the elderly [1], whose cognitive capability generally deteriorates as they age.

II. Dynamics of the Episodic Memory Model

We incorporate the Episodic Memory-Adaptive Resonance Theory (**EM-ART**) model [2] into MyLife to encode the personal memories in the form of episodic memory. EM-ART is a self-organizing neural network and in MyLife, it consists of the following three layers: (1) Bottom layer, where values of the individual input fields encode the 5W1H; (2) Middle layer, where the low-level inputs are encoded to form each event; and (3) Top layer, where a sequence of events is encoded as one episode. EM-ART encodes and adaptively stores the episodic memory during the bottom-up procedure and retrieves the stored memories during the top-down procedure. More details on EM-ART can be found in [2].

Fig. 1. Examples of the encoded memories in MyLife. (a) Encoded events of one episode where each photo and the context are encoded as one event. (b) Encoded episodes that each consists of multiple events (note that the order of the episodes is based on their encoded sequence, not the chronicle order).

In MyLife, there are six fields defined in the bottom layer representing the 5W1H, namely time (when), location (where), people (who), activity (what), imagery (which), and emotion (how, the categorization follows [3]). Among these fields, location and date values are normalized and the others are presented as binary vectors. Because EM-ART does not require the presence of all the input vectors (for both memory formation and retrieval) due to the usage of template masking and complement coding (comprehensive explanations can be found in [4]), MyLife allows omissions in the low-level input patterns. Each set of inputs is encoded as an event in the middle layer and a sequence of the related events is encoded as an episode in the top layer. Examples of the encoded events and episodes are illustrated in Fig. 1.

After the personal memories are encoded and stored in MyLife, the users can retrieve their memories by providing various cues. Based on the dynamics of EM-ART, MyLife supports the following five types of cues: (1) Exact cue, where the user provides all the exact search terms to retrieve a particular episode; (2) Partial cue, where the user does not provide all the search terms; (3) Vague cue, where the user provides incomplete information of certain terms (e.g., instead of an exact date, user can only input the year); (4) Inaccurate cue, where the user can lower the degree of confidence (referring to the vigilance parameter [2]) on certain terms (see Fig. 2a) if he or she is uncertain or making a guess; and (5) Random cue, where the user asks the system to generate some random cue for the memory retrieval.

Other than supporting the various types of retrieval cues,

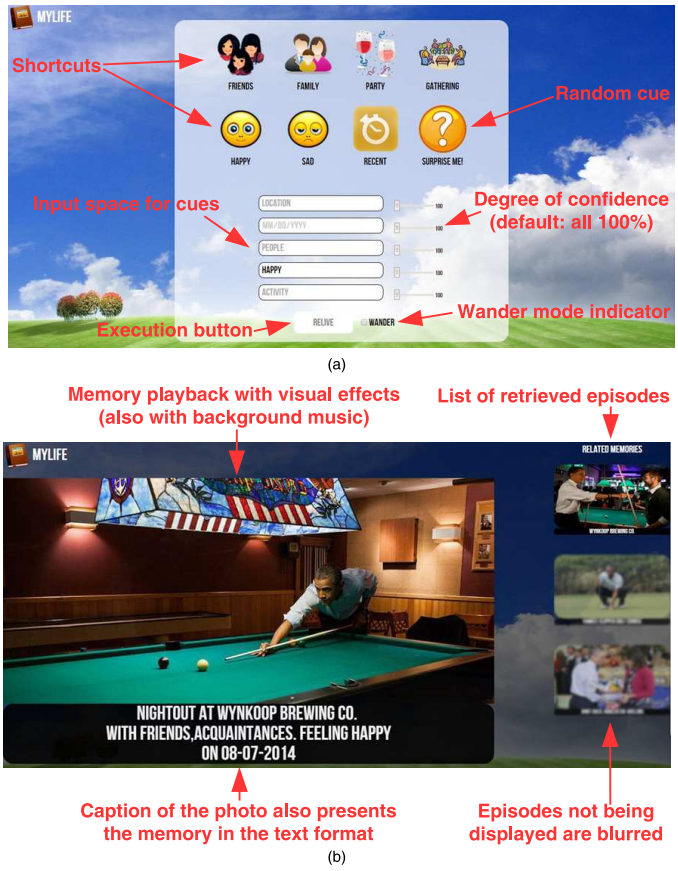

Fig. 2. Screen snapshots of MyLife. (a) Memory retrieval page where shortcut buttons are given together with input fields for retrieval cues. (b) Memory playback page where the retrieved memories are played back as a movie-like slide show with visual effects and background music.

which is an advantage over many photo album applications, MyLife also supports a wander mode for memory retrieval (see Fig. 2a). In that mode, MyLife does not only retrieve the memories based on the user provided cues (random cues are generated if user provides none), but also those based on the mutations of the provided cues (randomly decided by the system such as changing the value of a randomly selected cue). Moreover, the chain of memory retrievals goes for a random number of iterations. Therefore, the memory retrieval in the wander mode returns a set of randomly selected but related memories. Thus, the users can immerse in their past memories with an element of surprise (unexpected selection and order) rather than always browse through them in the same manner.

In addition, unlike many applications that present the retrieved photos in the timeline order, MyLife arranges the retrieved memories according to the relevance to the provided cues (based on the computed activity activation values [2]). Thus, based on the incorporated EM-ART model, MyLife stores and retrieves the memories in the way similar to how our brains do.

III. Demonstrations on the Memory Formation, Retrieval and Playback Functionalities

To demonstrate how autobiographical memories in MyLife are formed, retrieved, and played back, we use a set of 53 photos (in 13 episodes) of Mr. Obama, the current President of USA. Most of these photos are collected from Zimbio[1] and others using Google Images, where the context of these photos are provided on the same page. Instead of uploading the memories directly to MyLife, we show that they can be imported from Facebook. For that purpose, we first developed an application using Facebook's API. We then uploaded all the memories to Facebook and imported them to MyLife through the developed application. Fig. 1 actually shows the cropped snapshots of the developed application during memory importation. Because Facebook does not have the explicit fields declared for the context of the photo, we entered the context (using keyword pairs) in the annotations. Therefore, during importation, the context is extracted and presented in the corresponding low-level input fields of EM-ART.

Fig. 2 shows an example of memory retrieval in MyLife for all the stored happy moments (during memory formation, the mood of the event is determined manually based on the photo and its context). As shown in Fig. 2b, there are three episodes retrieved and one event in the first episode is currently being displayed. Because in this case, all the retrieved memories exactly match the provided partial cue (mood = happy), they are displayed in the chronicle order. During the playback, a matching happy music is played in the background. The music selection follows the classifications given by AllMusic[2].

IV. Conclusion and Future Work

In this paper, we demonstrate the memory formation, retrieval, and playback functionalities in MyLife[3], an innovative personal memory album. In the future, we aim to mine the context of the photo autonomously instead of explicitly define them. In addition, we will conduct user studies among the elderly to test the effectiveness of MyLife for enjoyment and health improvement.

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