

# Experiment of Recalling Emotions in Wearable Experience Recordings

Shogo Shimura<sup>1</sup>, Yasushi Hirano<sup>2</sup>, Shoji Kajita<sup>2</sup>, and Kenji Mase<sup>2</sup>

<sup>1</sup> Graduate School of Information Science, Nagoya University

<sup>2</sup> Information Technology Center, Nagoya University

**Abstract.** The miniaturization of information-processing devices has been enabling us to constantly record experiential movies recently. An experience contains not only phenomena and facts, but also moves of the heart and senses. It is difficult to record these emotions automatically. However, in order to record real experiences for recalling memory, it is also necessary to record emotions. This paper proposes an interface that can stimulate user emotions when experiencing movies in diary form. We performed a recall experiment, and confirmed that recall performance using this interface became higher than with conventional diaries.

## 1 Introduction

In recent times, computers and video cameras have been increasingly miniaturized and the capacity of hard disks has also grown. Given this background, there is much current research on constantly recording experiential movies and users' subjective states with wearable devices [1]. By continuously recording experiences, we never miss the split-second moment of an event. Furthermore, even if we forget an experience, we can recall it by watching recorded movies. Therefore, it is this foundation that allows us to propose a new model for a diary that can help us remember our experiences using movies in the context of a diary metaphor.

The word "experience" involves the watching and touching associated with activities and the knowledge thereby obtained from those activities [3]. It is necessary to record not only phenomena and facts, but also senses and emotions for true experience recording. It is impossible, however, to record emotions attached to the deepest and most private emotions automatically.

Therefore, we propose an interface that a user can use to record a diary of emotions, as and when the user feels it necessary to record an experience in the form of diaries. Besides, we performed a recall experiment to clarify that subjects could recall experiences more clearly when they used the movie diaries made with the proposed interface.

## 2 Experience recordings and assigning emotions to movies

If we continuously record experiences using a video camera, we will produce movies of enormous length, though such long movies would only be sparsely

populated with interesting experiences. Because they include many parts useless to a user, it is inefficient to watch these movies in their entirety. Users want to select only the experiences they desire to watch. An interesting experience can be classified as a moment when a user felt strong emotions. There is research on the extraction of interesting experiences using brain waves [1], but it is impossible to presume states of awakening or relaxation perfectly using only this statistic. In addition to it, if a user is in a wakeful state, we cannot say whether the user is interested in the experiences.

In this research, a user adds indices during/after interesting experiences that are recorded by experiential movies. It is thought that the objects at which a user looks and the environment yields his/her emotions. On the basis of a given index, the proposed interface searches similar images with a color histogram to infer whether a user looked at a particular object. The user can then modify part of an experience, because it is impossible to be certain whether the inferred part of interest corresponds to the real one.

As mentioned above, there are studies on recording brain waves and perspiration [2], but it is difficult to determine the user's emotions, such as tension or a feeling of discomfort, from these objective information. To record emotions, we suppose that a user expresses emotions in words and gives emotions to experience movies by him or herself. In this research, we have developed a diary interface tool with which a user can record emotions easily.

### 3 Diaries and assigning emotions to experience movies

In this research, there are two reasons for using a diary as an interface for which a user gives emotions to experience movies.

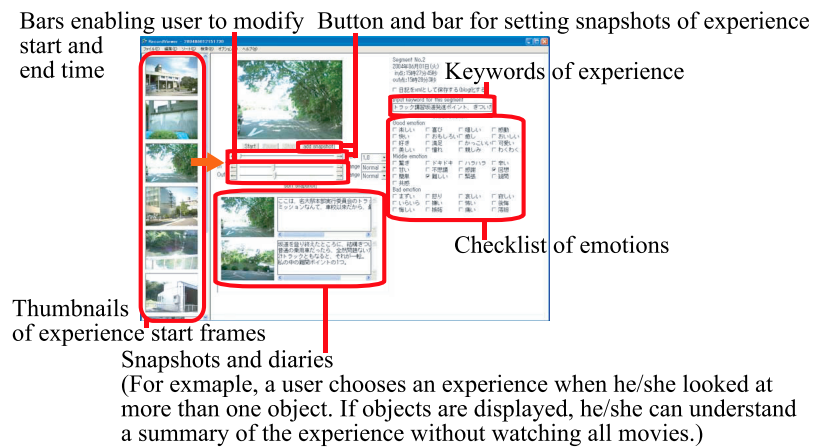
Firstly, a diary format makes it easy to describe emotions. Take, for example, the sentence: *"Today, I did something I enjoyed."* as a typical pattern. We want to emphasize the "I enjoyed." part; this expression describes a user's emotion. When we write a diary, we record our emotions unwittingly.

Secondly, diary-writing is a habit for many people. We assume that experiences are recorded everyday and that a user attaches emotions to the experiences viewed in the movies at the end of each day. This task should become a habit, we expect that a diary has a big possibility.

In the first point, we mentioned that a diary features a format suitable for describing emotions. However, there seems a case that a user cannot express emotions well using only a diary. As a solution, we have added a checklist of emotions, such as happiness, sadness, etc. , to this interface, which enables a user to record emotions partly with checking. An outline of this interface is shown in Figure 1.

### 4 Experiment and evaluation

We performed an experiment to verify the most effective approach to helping subjects recall their experiences, from among "diaries and a checklist of emo-



**Fig. 1.** Diary Interface

tions”, “only a movie” and “a movie, diaries and a checklist of emotions”. We asked six subjects to play a card game, a block game and playing cards wearing wearable cameras and microphones, and to give indices to interesting experiences at that time. In this experiment, they could enter an index with only a mouse click, that could be operated easily. After all the games ended, we asked each subject to set each experience part, to describe diaries and to check off relevant emotions on the checklist.

Six months after we conducted the above experiment, we classified the six subjects into two groups(A and B). Each group had three people, and we asked them to recall their experiences during the games.

Procedure 1: We asked subjects in a questions questionnaire to enumerate impressive experiences, and to answer whether they gave indices by multiple-choice.

Procedure 2:  
Conditions:

1. Reading diaries and referring to the checklist of emotions
2. Watching a movie
3. Watching a movie, reading diaries and referring to the checklist of emotions

Under each condition, we asked subjects to describe their situations and emotions for each experience, and to answer the five questions listed below using five choices (1: I could not recall the experience at all. 2: I could recall the experience a little. 3: I could recall the experience to some degree. 4: I could recall the experience considerably. 5: I could recall the experience perfectly.). Q1: Could you recall what happened? Q2: Could you recall who caused the experience? Q3: Could you recall the timing that the experience happened? Q4: Could you recall what emotional you felt? Q5: Could you recall why the experience happened?

Group A followed Procedure 1, Procedure 2 (Condition 1), and Procedure 2 (Condition 3) for the block game. They then followed Procedure 1, Procedure 2 (Condition 2), and Procedure 2 (Condition 3) for playing cards. On the other hand, Group B followed Procedure 1, Procedure 2 (Condition 2), and Procedure

**Table 1.** Means of the five-grade evaluation system of recalling experiences

(a)Recall(Cond. 1, then Cond. 3)						(b)Recall(Cond. 2, then Cond. 3)					
condition	Q1	Q2	Q3	Q4	Q5	condition	Q1	Q2	Q3	Q4	Q5
1	3.44	3.37	3.50	3.29	3.56	2	3.91	4.09	3.16	3.07	3.40
3	4.44	4.53	4.10	4.13	4.16	3	4.60	4.65	4.02	4.18	4.21

2 (Condition 3) for the block game. They then followed Procedure 1, Procedure 2 (Condition 1), and Procedure 2 (Condition 3) for playing cards.

Table 1 summarizes the means of the subjects' evaluations. Table 1(a) shows that subjects followed Procedure 2 (Condition 1), then Procedure 2 (Condition 3). Table 1(b) shows that they followed Procedure 2 (Condition 2), then Procedure 2 (Condition 3). We set up a null hypothesis that the means are equal under Condition 1 (Condition 2) and Condition 3. Upon testing with a two-side T-test, the null hypothesis was rejected with a significance level of 1% for all questions. This result indicates that "watching a movie, reading diaries and referring to a checklist of emotions" was best.

In a Condition 2 of Table 1(b), the rank of Q4 was lower than others. This indicates that it is necessary to assign emotions to experiential movies in some way, such as by this interface, to sufficiently recall of emotions.

## 5 Conclusion

In this paper, we explained the utility of recording experiences constantly with wearable devices. Using the proposed interface, subjects recalled more than when using only diaries and a checklist of emotions, or using only a movie.

Since the inference algorithm identified at which object a user looked with only modest accuracy, future work should include improving the inference algorithm.

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