

# Recalling Learning Log Based on Learning Style and Context

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**Abstract:** This study primarily exploits a context-awareness and personalization model supporting ubiquitous learning log system. The goal of the model lies in helping learners recall what they have learned utilizing the context and learner's learning style.

**Keywords:** personalized learning, learning log, context-aware learning

## Introduction

The new generation smartphones such as iPhone and Android accommodating users with many advanced functions such as the multi-touch interface, GPS, millions of applications are becoming more and more popular. One key feature of smartphones is that they are equipped with a range of sensors like the accelerometer, compass. This paper investigates the capabilities of the sensors of smartphones in context-aware and personalized learning based on two basic ideas. On one hand, it can monitor learners' current contexts including their activities and the environmental information and then it can support specified learner's learning taking into account both the context and his study needs. On the other hand, the model can track learners' contextual data as context history when they learn something using smartphones and catch individual's personal learning styles through analyzing the context history.

In addition, the model depends on a system called SCROLL (System for Capturing and Reminding of Learning Log) that allows learners to log learning experiences. The detailed introduction about SCROLL is given in Section 2. Section 3 presents the model in terms of its three dimensions. At last, the conclusion is given.

## 1. SCROLL

SCROLL is a system designed to aid users to simply capture the learning logs they have learned, review and reflect their old learning logs, reuse the knowledge when in need, be reminded at right time at right place and be recommended others' learning logs properly. Detailed introduction can be found in [1]. Based on the theory of encoding specificity and the theory of test-enhanced learning, quiz function is proposed to aid learners to recall their past learning logs [2], [3]. Its typical scenario of use is to assist international students to study Japanese in Japan. In this case, Japanese learners, who face rich learning contexts every day, can gain abundant of knowledge from their daily lives in different kinds of situations, such as shopping in the market, seeing doctor in the hospital, having a haircut in a barbershop, visiting the museum and so on. They cannot only take down what they have learned in those situations, but also will receive support from the system to recall and review them after that. This paper is presented based on the case study under this scenario.

## **2. Personalization and Context-awareness model**

The model we proposed consists of three dimensions, which are learners' current context, their learning styles or preferences and the learning objects. The following sections will introduce the three dimensions respectively in detail.

### **2.1 Learners' context**

In order to fully capture learners' context we propose a complicated model. We divide the context into three parts: learner's activity, status of device and environmental data. Based on the contextual data, the system will behave as follows:

- (1) Firstly, it will check the availability of the context. If the availability is high, the system then will ascertain whether there are learning objects near him (within 50 meters). The learning objects include two parts: those he learned and those that he may want to learn.
- (2) If the learning objects he learned exist, the system will show him reminder quizzes and he can finish quizzes considering the place as a retrieval cue.
- (3) If the learning objects that meet his learning requirement, the system will recommend these new learning logs for him.
- (4) Finally, the system will check whether the recommendation is responded. If not responded, the system will recommend one more time when the user comes to the place again. But totally the number of times of recommendation in a same area cannot exceed three times.

### **2.2 Learners' Personal Learning Styles and Preferences**

In our model, some personal attributes such as appropriate learning objects and memory cycle, are exploited as well. The detailed description about this is touched upon in the section 2.3. In this section, we will talk about some more personal learning styles or learning habits that can only be detected by mobile sensors. These learning styles involve where a learner usually studies (such as home or school), whether a learner has a habit of studying on the commuting train and when a learner prefers to study (e.g. before sleeping at night) and so on. In our opinion, these kinds of learning styles play a very important role on our learning because usually they are related to learners' daily customs and habits. The context histories collected from SCROLL consist of the context data when the users take down learning logs and do quizzes. The context history data covering location, time, and speed are utilized to detect whether a learner has any of the three learning styles mentioned above.

Take the learners' preferred learning time as an example. Because the time of learning every day is a discrete random value, we determine to repeat observing the regularity of the learning time in several periods to examine whether a learner has such learning style or not. Concretely speaking, we separate a day into 24 phases. Each phase stands for an hour. Then we count the number of times of learning collected from a two weeks period in different phase. The next two periods of four weeks will be observed as well. Finally, the frequency phase which occupies more than 25% of the all learning times in three periods will be thought as the learner's preferred learning time.

After achieved the learners' learning styles, the system can recommend messages when learners entered those environments. For example, when a learner stays in the place where he usually studies, a piece of message writing "The system guesses you are in a place where you usually do studies. Do you want to review what you have learned?" will be given. When it is his preferred learning time or when he is moving on a commuting train, he will receive a similar message as well. Finally, by checking the learners' response the system can

modify its prediction: if the system shows messages for him more than three times based on the same learning style without any responses, this learning style will be disabled.

### 2.3 Learning Objects

In this study, a learner's learning objects can be separated into two types: the learning logs that he learned (the ones that he uploaded or glanced through) and the ones recommended by the system. In order to provide learners with appropriate learning objects, when to remind them of the learned learning logs and what to recommend for them are two important issues. The former one is about the timing to show learners their learned learning logs in quizzes. The system adopts the graduated-interval recall method proposed by Pimsleur [4]. The intervals are 5 hour, 1 day, 5 days, 25 days, and 4 months and so on. That is to say, after a learner added a learning log, the quiz about it will be available after 5 hours and then after 1 day and so on. Learners will be reminded continually. As for what to recommend, the system takes into account the profile of the owner of to be recommended learning objects. It means that the learning log whose owner has the same both study language and mother language will be firstly recommended. And the specified learner should have the same ability level with the owner.

### 3. Conclusion

In this paper, we introduced a personalization and context-awareness model on the basis of learning log system. It assists learners to review what they have learned and recommend others' learning experience for them by utilizing the context. Also, it can detect learners' learning styles by analyzing their context history and prompt them to review past knowledge according to their learning styles.

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