SLLL at the NTCIR-12 Lifelog Task: Sleepflower and the LIT Subtask

Satomi Iijima
Waseda University
satomi.i@fuji.waseda.jp

Tetsuya Sakai
Waseda University
tetsuyasakai@acm.org

ABSTRACT

SLLL (Waseda University **S**akai **L**aboratory **L**ife**L**og team) is working on a prototype smartphone application called Sleepflower, which is designed to improve the sleep cycles of a group of users through a collaborative effort. A flower metaphor is displayed on the smartphone screen to represent the current sleepiness of a particular user, along with similar metaphors for the other group members, in the hope of improving the lifestyles of the group as a whole. One significant limitation of the current prototype is that sleep hours and sleepiness grades need to be entered manually; we are hoping to build a new prototype that semi-automaticallly collects lifelog data such as those provided by the NTCIR Lifelog task. As an initial step towards this goal, we manually analyse the NTCIR Lifelog image data from the viewpoint of individual sleeping habits and discuss possible approaches to leveraging such data for the next version of Sleepflower.

Team Name

SLLL

Subtasks

Lifelog Insight Task

Keywords

lifelog; human computer interaction; interface; healthcare; sleep.

1. INTRODUCTION

SLLL (Waseda University **S**akai **L**aboratory **L**ife**L**og team) participated in Lifelog Insight Task of NTCIR-12. Sleeping habits are regarded as key for healthcare. However, improving sleeping habits is not easy since it is hard to monitor subtle changes in them. It is often the case that people without apparent health problems are not motivated enough to manage their sleeping habits. Many attempts have been made to monitor sleeping habits. As one such effort, we are working on a prototype system called Sleepflower for the purpose of motivating users to manage their own sleeping habits. The system enables a group of users to monitor the members' sleeping habits for mutual encouragement. However, one serious limitation of the current prototype is intrusiveness: it requires users to input sleep hours and sleepiness grades manually. We would like to semi-automatically collect such data from lifelogs such as those provided by the NTCIR Lifelog task. To this end, we performed an initial manual analysis of the NTCIR Lifelog image data to find useful cues for detecting sleeping habits.

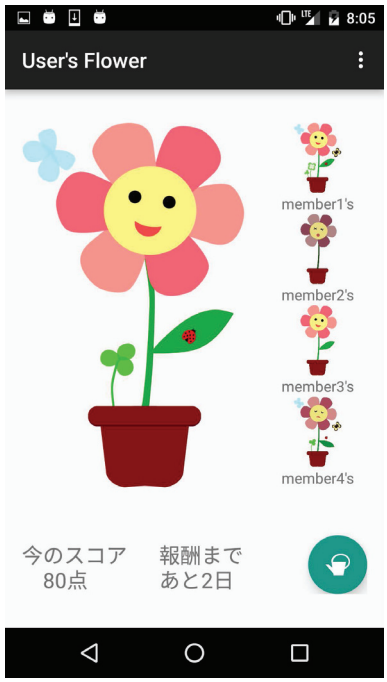

Figure 1: Sleepflower's main view

2. SLEEPFLOWER

Our prototype system, Sleepflower, aims at motivating people to have better sleeping habits through collaborative effort within close friends.

With Sleepflower, the user raises a virtual flower: a screenshot is shown in Figure 1. The flower reflects the user's current condition. It has two dimensions. The first dimension represents temporary health: if the user had a bad sleeping habit at some point, the flower immediately becomes sick. The second dimension represents long-term health. If the flower is kept healthy for several days, it is decorated with a leaf, butterflies and clovers. We found in our previous work that, by sharing the flowers among a group of close friends, Sleepflower is able to motivate the users to improve their sleeping habits.

Figure 2 shows the outline of Sleepflower. Each user inputs his/her sleeping hours every day, as well as sleepiness grades ("not sleepy at all," "slightly sleepy," "dozing," "fell asleep at desk," and "lay down and took a nap.") every 90 minutes. Entering "not sleepy at all" will make his/her flower healthier, while "lay down and took a nap" will make it cry.

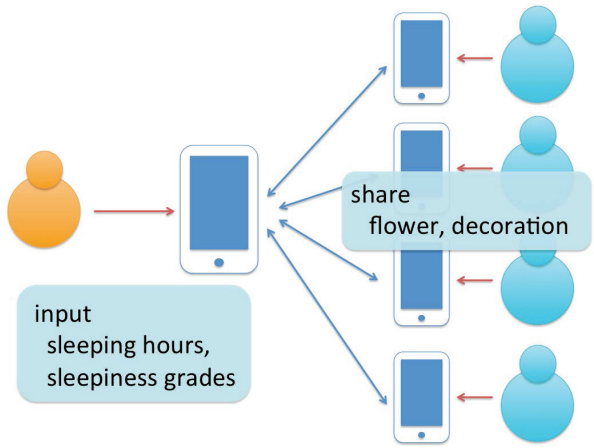

Figure 2: System outline

3. FUTURE WORK

This section discusses what we eventually would like to accomplish by leveraging lifelog data such as those provided by the NTCIR-12 Lifelog task.

3.1 Sleep Recognition

Since lifelog pictures are taken only when the user is awake, sleeping hours can be calculated using the image timestamps. A more challenging task would be to detect daytime sleepiness from images. Would it be possible to accurately detect the user's dozing movement from the images? For example, if a series of pictures suggests that the user is sitting still and yet not using his/her hands, this might be a hint that the user is dozing. However, we have not found such cases in the NTCIR Lifelog image data in our initial analysis.

3.2 Visualization

While the current prototype of Sleepflower only shows the flowers of all group members to each user, it does not visualise more details such as the members' exact sleeping hours and daytime sleepiness. We plan to add an interface to Sleepflower like the one shown in Figure 3. The darkest green patches represent the sleeping hours, while the lighter patches reflect different sleepiness levels. At least, the sleeping hour patches can easily be implemented based on the image timestamps as was discussed above.

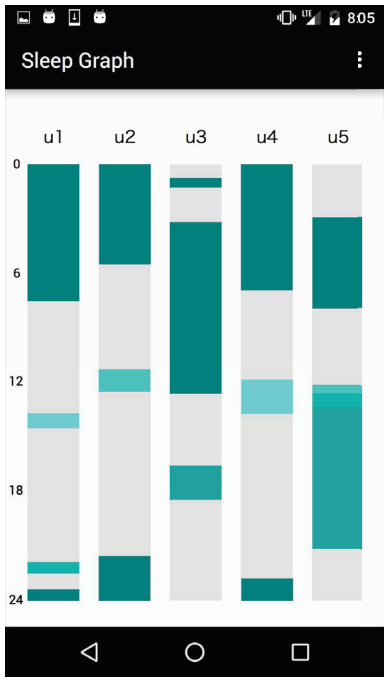

Figure 3: Sleep graph

3.3 Personalized Advice

Besides sleeping hours and sleepiness levels, lifelog image data can probably provide various features for us to estimate the quality of sleep, such as dining hours, alcohol consumption, amount of exercise, and blue light exposure. By leveraging the rich data, we would like to provide more personalised advice to each user, and to incorporate the quality of sleep into our flower metaphor.