

Analyzing Expenditure History on basis of Location and Time Data Acquired using Expense Recognition Wallet

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ABSTRACT

We describe our ongoing study that explores the usefulness of automatically recording expenditure history. The data recorded include the amount of money spent and the context for each expenditure, i.e., the location and time. To this end, we developed the Expense Recognition Wallet (ER-Wallet) and the MoneyLog Viewer. The former is a wallet with embedded circuitry that automatically recognizes the amount of money spent by the owner. The latter is an application for analyzing personal financial information geographically and temporally.

Author Keywords

Lifelog; moneylog; personal finance management; user studies.

ACM Classification Keywords

H.4.0 Information Systems Applications: General; H.5.0 Information Interfaces and Presentation: General

General Terms

Design, Experimentation

INTRODUCTION

Conventional personal financial information (PFM) tools, including PFM software (e.g., [3]), PFM Web services (e.g., [2]), and mobile PFM applications (e.g., [1]) do not automatically record expenditures of cash; a user must manually record the amount of money spent, imposing a burden on the user. As a result, users tend to give up on recording expenditures.

We have developed a wallet with embedded circuitry called the Expense Recognition Wallet (ER-Wallet), which automatically recognizes the amount of money spent by the owner and records the results, along with the location and time. We have also developed the MoneyLog Viewer, an application for reviewing one's moneylog. Using the MoneyLog Viewer, the

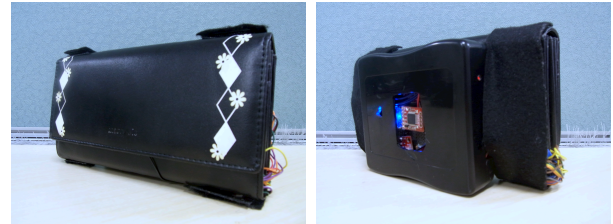


Figure 1. Prototype of the ER-Wallet: (left) the front, and (right) the rear.

user can examine his or her expenditures both geographically and temporally along with the amount of money spent.

ER-WALLET AND MONEYLOG VIEWER

The ER-Wallet is a wallet that records the user's moneylog every time the wallet is used. A prototype of the ER-Wallet is shown in Figure 1. The size is 190×100×70 mm (circuit: 105×95×30 mm); the weight is about 300 g (circuit: about 180 g). Since we built this prototype using commercially available breadboards, microcontrollers, and sensors, its size and weight could be drastically reduced by using a custom-made IC board and sensors.

The ER-Wallet recognizes an expenditure and records the amount when the user closes the wallet. The location and time are recorded at simultaneously. It detects open or closed status via metallic snaps on the wallet, each of which is connected to a microcontroller.

We assume that a wallet has pockets, and that the same denominations are placed in the same pocket, allowing us to count the number of each denomination in the wallet. The amount of an expenditure is recognized as the difference between the number of bills counted between the last transaction and the current one. In this study, we considered the denominations usually used in Japan: 1000 yen, 5000 yen, and 10000 yen. An optical approach is used to count the bills within the wallet. In each pocket of the wallet, there is an LED and a brightness sensor, placed face-to-face. The number of bills is recognized by turning on the LED and determining the brightness at the sensor. The LED is placed so that the light rays are aimed at the bill watermarks (which are at the center of the bill) and at the brightness sensor. Since this approach requires the use of only two types of sensors (luminance and brightness), the architecture is simple.

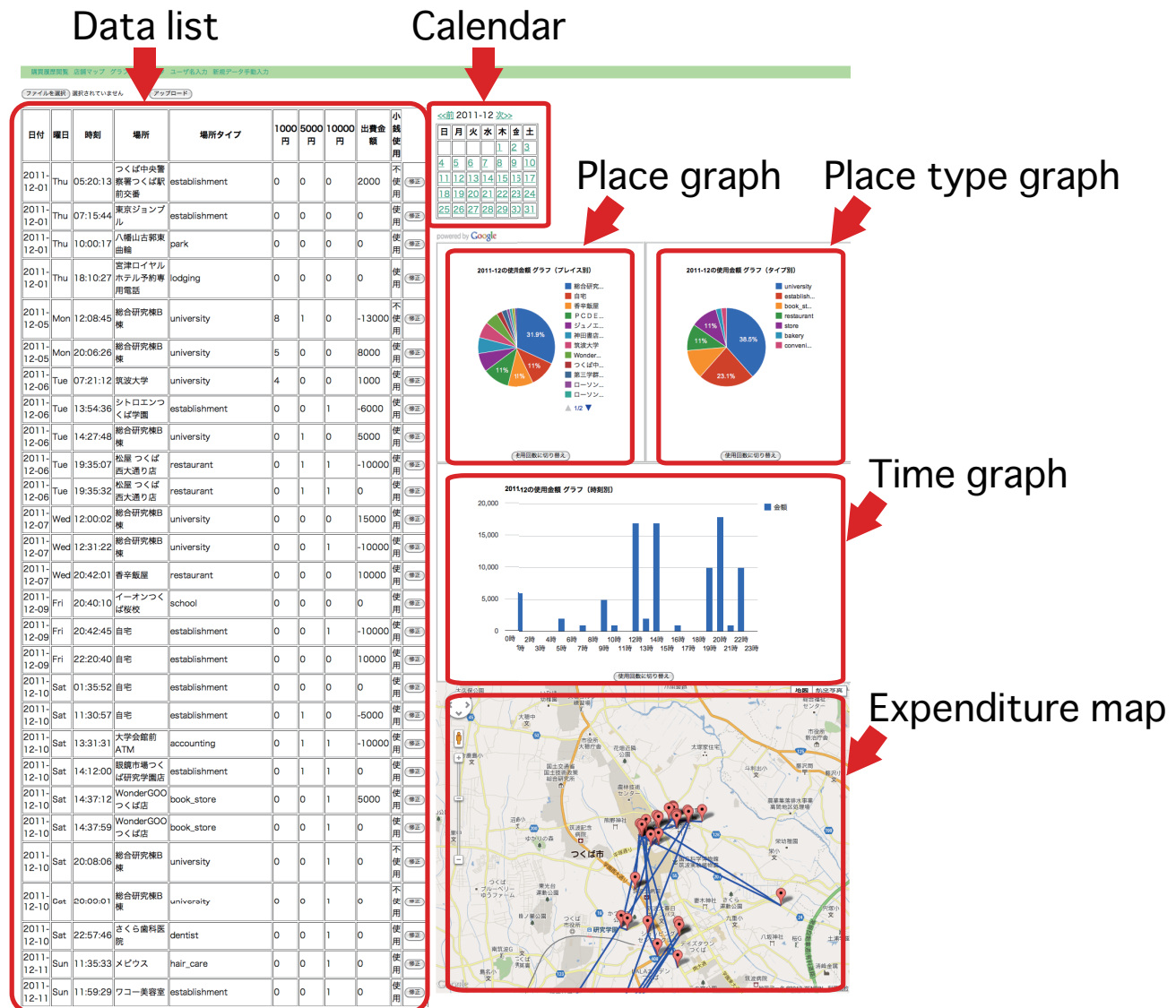


Figure 2. MoneyLog Viewer.

The MoneyLog Viewer application provides a data list, charts, and expenditure map. Each item shows the data for a specific month. The example in Figure 2 shows the expenditures of one author for the first 11 days of December 2011. A month is selected using the calendar, and selecting a specific day of the month displays the expenditures for that day. In this example, by viewing the expenditure map, the user can view the areas where the user spent money over a given month (a particular route in this case) visually. In this map, we can see the author spent money mainly in the center of the map, the area is around our university and we can guess that he may spent money so many times in this area.

CONCLUSION AND FUTURE WORK

We presented the ER-Wallet and the MoneyLog Viewer. We are now planning a long-term experiment to examine how users might set financial goals and improve financial savings based on the awareness they obtain from MoneyLog Viewer.

This experiment will also serve as a quantitative evaluation to examine how much money users can save.

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