Catchy Account: A System for Acquiring a Realistic Sense of Expenditures

Mieko Nakamura
Meiji University
1-1-1, Higashimita, Tama-ku, Kawasaki City
Kanagawa 214-8571
+81-44-934-7227

mieko@isc.meiji.ac.jp

Homei Miyashita
Meiji University/JST,CREST
1-1-1, Higashimita, Tama-ku, Kawasaki City
Kanagawa 214-8571
+81-44-934-7238

homei@isc.meiji.ac.jp

ABSTRACT

In this paper, we propose a new household accounting system for realistically sensing expenditures. In 2D mode, expenditures are visualized through the placement of rectangles whose areas are proportional to the amount spent; thus, each item can be understood within the context of the total expenditure. In AR mode, spheres whose volumes are proportional to the amount spent appear to be floating in the camera image. The spheres fill the entire room and the size of expenditure can be realistically sensed. We designed this system in an attempt to "augment" the experience, so that the user can acquire a more realistic sense of expenditures.

Categories and Subject Descriptors

H.1.2 [Models and Principles]: User/Machine Systems—*human factors, human information processing*; H.5.2 [Information Interfaces and Presentation]: User Interfaces—*graphical user interfaces, screen design*

General Terms

Human factors

Keywords

accounting, visualization, realistic sense

1. INTRODUCTION

Most human beings survive by using money to purchase goods and services to satisfy their daily needs. When living in a society based on a money economy, it is important to keep track of the amount of money one spends. However, some transactions such as credit card purchases and bank transfers are not accompanied by actual exchange. Therefore, it is difficult to have a realistic sense of expenditures when presented with numerical figures alone.

In a typical house, household accounting software is used to record income and spending and to analyze various aspects of the household economy. However, in reality, it can be difficult to continuously maintain records and learn how to analyze them.

When a user begins to maintain a record of household expenses, he/she needs to develop a system of classification and draw up each budget. The classification of data is very important to the analysis of the record for a given period of time. However, in the daily task of bookkeeping, we are occasionally unable to decide how each item should be classified. Such indecisiveness can render the analysis of specific time frames useless.

In the task of daily bookkeeping, it can be very difficult to grasp the patterns of our expenditures and survey our entire expenditure. One purpose for maintaining a record of household expenses is to understand the pattern of daily expenditures and to implement measures to control them from the next day; thus, we need timely information not only the analysis of the record for a given period of time.

In this paper, we propose a new household accounting system for realistically sensing the amount of money spent. In 2D mode, this expenditure is visualized through the placement of rectangles whose areas are proportional to the amount spent; thus, each item can be understood within the context of the total expenditure.

In AR mode, computer graphics synthesize spheres whose volumes are proportional to the amount spent and appear to be floating in the camera image. When viewing these spheres, which fill the entire room, the relative size of expenditures can be realistically sensed. The purpose of this system is to enhance the user's sense of money and to enable him/her to seamlessly shift from a micro-perspective to a macro-perspective. We designed this system in an attempt to "augment" the experience, so that the user can acquire a more realistic sense of expenditures.

2. RELATED WORKS

Lamming et al. [1] discuss supporting human memory through the use of a wearable device. This important study aims to augment the cognition of information though the augmentation of memory.

Yamaguchi et al. [2] propose a visualization technique called the "Data Jewelry Box" algorithm. It is a visualization technique for providing overviews of large-scale hierarchical data. Bookkeeping data is a type of hierarchical data, and it is important to have constant access to overviews whenever we input prices. A large number of bookkeeping software programs designed for households are available. For example, MoneyLook [3] has a function that enables the user to input data from various devices. The difficulty in maintaining a tight relationship between the flow of real money and the actual data recorded in household accounts is a major cause of users' loss of motivation in tracking and

managing household economies. Indeed, it is beneficial to maintain a timely record.

3. SYSTEM

The purpose of this system is to provide an interface that gives users a realistic sense of how much money has been spent. To acquire a realistic sense of money, we need to have an image of an "amount" from numerical figures. For example, when people think of 1,000,000 yen, many of them will imagine a wad of bills. Thus, we have a realistic sense of money when the number 1,000,000 is transformed into the image of a wad of bills.

The system visualizes expenditures through the display of rectangles whose areas are proportional to the amount of money spent. The benefit of using rectangles is found not only in their varying sizes but also in their varying colors and locations. For example, rectangles clustered together in a particular screen location indicate they belong to the same classification.

The system has two modes: One mode is designed for money input and for displaying expenditures as 2D rectangles; the other mode is designed to display these amounts using an augmented reality technique.

The money input section in 2D mode is where we input the date, item, and price. The system calculates the size of the rectangles according to the item's price and displays it immediately (left side of Figure 1). You can select the color of each rectangle depending on each item's importance, classification, or degree of settlement. We believe that such visualization will help the user understand each item better in relation to the total expenditure. The rectangles can be moved by dragging them. If you place the expenditure rectangle on the income rectangle, you will see the rate of that value at a glance. Varying the colors and positions of the rectangles allows us to use indicators of money. For example, you can change the color according to the classification, or you can input the expenditure it's not fixed yet with a light color (the brightness of a color is a good indicator of surety.). Alternatively, you can place the rectangles representing the fees for a party, travel costs, and accommodation charges clustered together in one location. In this manner, you can comprehend at a glance the relation between each of the expenditures even if they are recorded in different classifications.
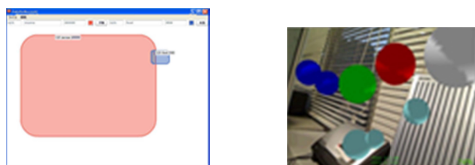

Figure 1. Visualization in 2D mode and AR mode

In AR mode, you can view the AR spheres in a room's photograph. Each sphere corresponds to a particular expense (right side of Figure 1). In 2D mode, you can change the scale of the display to view the entire data set. However, in AR mode, you can see spheres of the same size according to how the marker is set. That is, if you fix the marker in your room, you can view

spheres of the same size in your room. Increasing the number of spheres or the size of spheres will give you a realistic sense of expenditures.

4. DISCUSSION

Classification is very important in maintaining a record of household expenses. However, even if we carefully decide how to classify items, we are occasionally unable to decide which category the data should be recorded in. The above system enables us to input data without being concerned about the classification. Classification is easily determined later when selecting the color or location of the rectangles. Figure 2 shows the display image of this system with real data. Each rectangle was placed according to the classification after all the data were input.

Figure 2. Execution screen of 2D mode

The daily task of bookkeeping tends to encourage people to focus on details, that is, to adopt a micro-perspective. With this system, the bookkeeper can access an overview of the balance sheet. It is a tool that allows the user to seamlessly shift from to a micro-perspective to a macro-perspective. Moreover, with the use of AR technology, we may succeed in giving people a realistic sense of their expenditures. Currently, people deal with money in bank accounts without even seeing any cash. While they can download data on their cash flow from the bank, it is difficult to fully conceptualize the value of spent money from the data alone. This system may augment and enhance this experience, so that the user's ability to conceptualize expenditures is not limited by the representation of money by numerical figures alone.

In future research, we will introduce the timeline interface that will display a record of household expenses according to time flow. We will also continue to discuss ways in which these interfaces may provide humans with a more realistic sense of their expenditures.

5. REFERENCES

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