Personalized Information Service Model that Reflects Individual's Will

Yuri Nakagawa[1], Yuuki Matsuda[1] and Tetsuro Ogi[1]
[1] Graduate School of System Design and Management, Keio University
Collaboration Complex, 4-1-1 Hiyoshi, Kohoku-ku, Yokohama, Kanagawa 223-8526 Japan.
Tel: +81-45-564-2518, Fax: +81-45-562-3502, E-mail: yurinkgw@z8.keio.jp

Abstract
Recently personal data is attractive for the companies to use for marketing and provide a personalized service. However, it is difficult for individuals to access these data, and they don't have any means to benefit from their own records. To solve these problems, we suggested framework for handling personal data to give the power back to individuals. Especially we focus on buying information, to build this framework, we conducted survey research how to handle it. In this paper, to build this framework to give rewards back to individual without any stress, we discussed about a new digital signage system.

Keywords:
Personal data, Life Log, Big data, Buying Information, Digital signage

1 INTRODUCTION

Recently, with the development of the information communication technologies and the pervasive applications, personal data such as buying information and action history have been recorded throughout the society.

The personal data consists of personal attribute data such as address, birth, title and so on and personal history data such as buying information, action history, food history and so on. These data can be analysed as big data and are attractive for not only the companies to use for the marketing and for providing a new personalized service but also the government. For instance, the Japanese government is offering a 5.3 billion yen subsidy in 2012 [1]. JIPDEC, which is a non-profit organization established with the aim of enhancing the development of economy and community offers many services for personal information protection and information security [2].

However, it takes a long time to build social systems, and individuals have difficulties to access these data, and they usually do not have any means to benefit from their own records, even though they generate these data by themselves. In this study, we suggested a framework for handling personal data to give the power of personal data back to individuals in balance between individuals and companies. The company can also use it freely across the companies though most current companies hold only limited personal data that is collected by each company, if individual allow using it.

In this paper, we focus on buying information that is got automatically using the Point of Sales (POS) system [3] that was developed in our previous work. In this system, when the customers use the IC card, the POS system sends the buying information to the server so that the customers can use the recorded data. Especially, in this paper, we classify the individual's will for handling buying information based on the questionnaire survey, and propose a template for the self-control of buying information.

The next section shows the situation about personal data and section 3 explains the proposed framework in handling personal information. In section 4, we discuss the classification of individual's will in handling buying information based on the questionnaire survey and propose the templates for controlling it. In addition, in section 5, we propose the idea of new digital signage system that displays personalized data based on the proposed framework.

2 MARKET TREND AND RELATED WORKS

In these days, not only company but also the government is engaging in a lively exchange of opinions regarding "Handling about Personal data" [4]. Moreover, here are many studies about personal data, and also each country has national strategies and policies [5]. In this section, we introduce hot market trend and related works and discuss how different from our study.

2.1 World Situation;

The World Economic Forum reported "Rethinking Personal Data: Strengthening Trust" in 2012 [6]. They discussed how the potential value of personal data could be unlocked. But they focus on only for the benefit to companies and organizations. Of cause they are care about individual's benefit but not first priority.

In EU, the Commission proposed the EU legal framework on the protection of personal data in 2012 [7]. They said "Everyone has the right to the protection of personal data." This is very strong law and they forced to obey this law to many countries under EU. But they focus on only benefit to individual, not to balance between companies and individual.

In U.K., BIS（Department for Business Innovation & Skills）opened new projects as midata [8] in April, 2011. It is the one of the Consumer Empowerment Strategy. This project aim that, 1) get more private sector businesses to release personal data to consumers electronically, 2) make sure consumers can access their own data securely, 3) encourage businesses to develop applications (apps) that will help consumers make effective use of their data. Actually, many companies (ex. Google, British Gas, Lloyds TSB and O2.) are joining this project. It is very similar to our framework, but they focus on only how to access to it which "the company hold". They are unmentioned to "Could download their own data" and "Hold it by themselves".

2.2 Market trend; about the companies

In business, there are many companies that use personal data in the world. For instance, Blukai, Tesco, Personal inc., Infochimps, Demdex and so on [1][9][10]. These companies use personal data to provide many services which pass on the benefit to individual. For

instance, in Japan, McDonald and Zennisshoku give some discount ticket and information of basement merchandise to customer by using and analysing customer's personal information. But unfortunately, this benefit is not enough to customer, and also there is no reasonable way to give our personal data to the companies under our control. And also, Sony and Kawasaki city office made the cloud systems that are gathering personal history data of using medicine in Kawasaki, Japan. Sony collects these data into cloud system and provides it to pharmaceutical company as statistical information. Of cause, customer can receive many kinds of service and live much more convenient, but, they do not ask individuals to allow using it. On the other hand, there is much news that the company sells personal data without any individual's permission in Japan. And also, in U.S.A., the Federal Trade Commission penalizes online Company in Sale of Personal Data for protecting consumer.

There is no way to balance the benefits of both individuals and companies.

2.3 Related works

There are many related works, which focus on personal data.

For instance, there are some developed systems that are able to stock own personal data such as movies and pictures automatically [11][12][13]. It becomes much easier to collect personal data automatically than before, and also we can enjoy collecting it much more than before.

And also, there are some systems that are able to manage personal own data. PIMA enhanced both human-computer interaction and application integration for PIM on mobile devices [14]. It becomes more perceived usefulness, ease-of-use, and efficiency of PIM on mobile devices. Open PDS by MIT allows individuals to collect, store, and give fine-grained access to their own data all while protecting their privacy [15]. They provide a secured space. Therefore, individual can manage and control the flow of data much safer than before. With these systems such as PIMA and open PDS, individuals are able to use or manage their own data much easier and safer than before.

They become recognizing and discussing consumers' rights to data ownership in personal data and how important individual-oriented information privacy model [16][17]. However these works are discussing only how to collect such as which device use or how to manage. They do not refer to the need to get reward and be balanced the benefits of both individuals and companies.

We aimed to suggest framework for handling personal data to give the power of personal data back to individuals with rewards on each investment. And also, at the same time, the company can also use it freely and across the companies, if individual allow using it. Especially, in this paper, we classify the individual's will for handling buying information based on the questionnaire survey, and propose a template for the self-control of buying information.

3 PROBLEMS AND SOLUTIONS

In this section, we discuss about three problems that we are able to recognize under the situation of current personal data and suggest the framework to solve it.

3.1 Problems

There are three problems to solve, under this situation:

- We don't figure all of our own personal data out, and also there is no reasonable way to control it.
- There is no reasonable way to give our personal data to the companies under our control and also we are not able to receive a proper reward from companies.
- The companies can hold only limited personal data that is collected by each company.

There are many applications that collect their own personal data on mobile phone and iphone, and we are using it easily. We could get personal data and recognize them much more easily than before. However, we could not have gotten a full picture of them yet. And also, for many years, the companies have used personal data, as customer data to better understand consumer and use for marketing without any permission from each individual. However, individuals have not only difficulties to access, but also do not have any means to benefit from their own records, even though they generate. In fact, according to previous research [3], many people are eager to know and handle these personal data by themselves more.

On the other hand, the companies can hold only limited personal data that is collected by each company. Not only in Japan but also in UN, if they can identify an individual, it's forbidden to share personal data among companies by law. However they want to know whole data for marketing. Therefore, sometime they edit it to avoid identifying an individual and then sell or buy it, although it is offensive to some individuals. In fact, we can see it on the headline news throughout Japan and also, in U.S.A, FTC penalized one of the companies that sold personal data.

Therefore, we aim to suggest framework for handling personal data to give the power of personal data back to individuals [18]. And also, at the same time, the company can also use it freely and across the companies, if individual allow using it. We need a new framework that can be balanced the benefits of both individuals and companies.

3.2 Solutions

To solve these three problems, we suggest framework as below for handling personal data to give the power of personal data back to individuals. And also, at the same time, the company can also use it freely and across the companies, if individual allow using it.

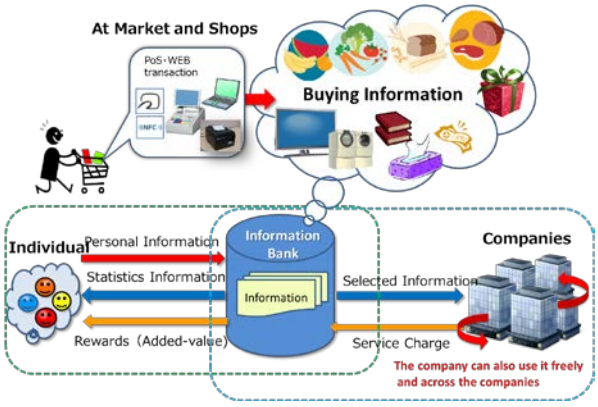


Fig.1 Overview of proposed framework

About this framework, individuals can hold their own personal data in Information bank, and they are able to manage and access it whenever they want to use.

Information bank is a secured space and individual can't change their own data by themselves, so personal data can be saved safer. And also, individuals can receive new services, like household account application that can manage how they spend their money and so on. At the same time, the company can also use it freely and across the companies, if individual allow using it.

This is a new framework that can be balanced the benefits of both individuals and companies.

4 HOW TO HANDLING PERSONAL DATA

In this section, we discuss about the structure that is able to handle personal data easily by focusing on buying information.

4.1 Structure

In previous study, to solve the first problems, we studied about system that could get personal data, especially focus on purchase information [3]. We made prototype of household account application getting buying information automatically from Point Of Sales systems by using network, and evaluated its marketability and effectiveness. On household account application, we don't see a row data; we can see well-edited data to help them understand easily. And also, to aim for the realization of this framework and solve the second problems, we studied about system structure that the companies are able to use personal data which individual selected under their control. To build this structure, there are two points: 1) Individual can select which data will they provide and which companies will be able to use it. 2) Individual who put in control their data and allow using it for the companies can receive much more rewards than the other who wouldn't like to participate this framework. With these two points in mind, we discussed how to handle buying information.

4.2 Consideration about Buying Information

Where and when did you buy? What kinds of things did you buy? This information is so-called buying information and we can see these on receipt. On the receipt in Japan, there is much information as below: The name which you bought, the company which made, the place where you bought, the time when you bought, the calorie of the meal which you ate at the restaurant, and so on. These have much personal information.

To be able to select without any resistance and to allow using it for getting more rewards on this framework, we conducted survey research how to handle buying information. Especially wanted to know:

- Is there any difference by individual?
- What kind of information in buying information does individual want to keep a secret?

4.3 The Questionnaire Survey on Handling Buying Information

To investigate the resistance to use it for getting more rewards on this framework, we conducted survey research. The overview of this questionnaire is as below.

We asked open and closed ended questions on the web site and print.131 people, who consist of students and teachers at graduate school of System Design and Management, Keio University, personal friends on Facebook and prints and voluntary bodies and kindergarten mother, answered to us. The rate of this survey is; male 51%, female 49%, Married 61%, Unmarried 39%, 20's 24%, 30's 37%, 40's 18%, 50's 6%, 60's 8%, over 60's 5%.

In the questionnaire, we asked individuals whether they might give their buying information to the different types of companies under different cases. For instance, under case 1, there is no possibility to identify individuals. Under case 2, there are a few possibilities to identify individuals. Under case 3, there are some possibilities to identify individuals.

About buying information, we grouped it into categories such as food costs, luxury goods costs, entertainment costs, daily necessities, expendable supplies costs, book costs, medical expenses, expense account, educational expenses, the expense that it cost for work, insurance cost, tax, costs of utilities, communications expenses, cut rate, calorie of the food. There are 15 kinds of categories in total.

As for the products in each category, we asked respondents to make judgment whether they allow the buying information that consists of product name, or product name and date information, or product name and place information to be opened to the companies. In this case, the companies were classified into major company like Wal-Mart Stores and Carrefour S.A., small private shop which user knows each other, and advertising company like Omnicom Group and WPP plc.

4.3.1 Result and Discussion

We were able to get results as follow:

There are many kinds of differences between many kinds of cases, which are the results for each expense category, each company type, gender, civil status, and age.

For instance, Figure 2 shows the differences between married and unmarried people. For instance, more than 47% of unmarried people feel free to open their Tax information to small private shops. However, there are only about 25% of married people who are happy to do the same.

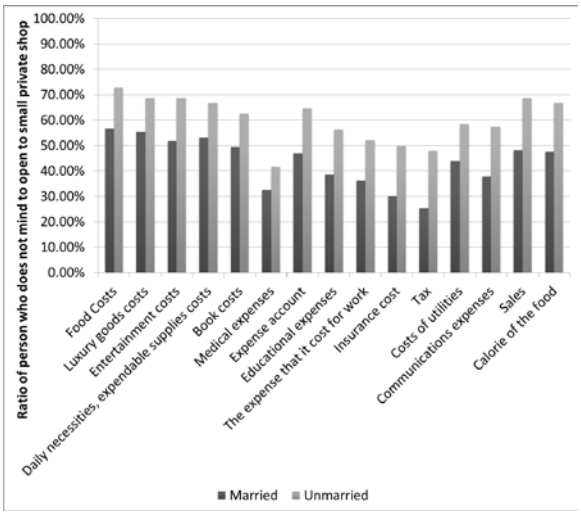


Fig.2 Differences by civil status.

Table 1 shows the results of the test of population rate by civil status. In particular, there are many significant differences at the 5% significance level. In many categories we could recognize differences between civil statuses on the 5% significance level. There are differences between married and unmarried people. This implies that people become more conservative when they get married. (They may be thinking more about risk when they have a family.)

Therefore, there are differences between married and unmarried people.

Table 1 Differences by civil status.

Category	Ration of person who does not mind to open to small private shop		Data	P value
	married	unmarried		
Food Costs	44%	64%	Trade name + date info	0.027240551
Food Costs	42%	64%	Trade name + place info	0.013425188
Expense account	7%	21%	Trade name + date info	0.035866731
Luxury goods costs	42%	64%	Trade name + date info	0.013425188
Entertainment costs	42%	60%	Trade name + date info	0.044095502
Educational expenses	30%	52%	Trade name + place info	0.018887314
Insurance cost	26%	45%	Trade name + date info	0.02402458
Insurance cost	25%	45%	Trade name + place info	0.015895168
Tax	22%	43%	Trade name + date info	0.012503024
Tax	21%	41%	Trade name + place info	0.015180683

We also asked open-ended questions. We got results as follow.

Table 2 shows a part of the answers for “What kind of reward do you want to get back, when you open your personal data to the company?”

There are many different kinds of answers. Though some answerers want to get many rewards like cash, services and attractive information, others do not want to any rewards even they open it to the company. It seems that the opinions of recent people have become different compared to previous research [3].

Table 2 Reward that answerer want to get(a part)

What do you want to get back as reward?
I do not care about any reward. Even nothing back to me, I can give my personal data.
Never open my personal data. Even the companies give a huge amount of rewards.
Cash(1,000 yen, 2,000yen, 50,000yen, 10,000yen and more)
Discount
Coupon or point(In Japan, there are many kinds of point card, and use point as a cash)
Exchange to air miles.
Many services (application about house hold accounting and reduce the time and effort spend on counting.)
Attractive / useful information (discount, recommendation, and so on)
Not necessary.

5 APPLICATION IDEA

In previous section, we could get the results that there are differences among people from the questionnaire. The result shows the differences of among each expense category, gender, age, and the company. And also, there are some different opinions about value of personal information. Some wants to open their personal data, but the other do not. Some wants to manage their own data, but the other do not.

There are differences between many different situations. It means that it is totally different among individual.

Therefore to build this structure to give rewards back to individual without any stress, it is very important to accept each individual’s requests.

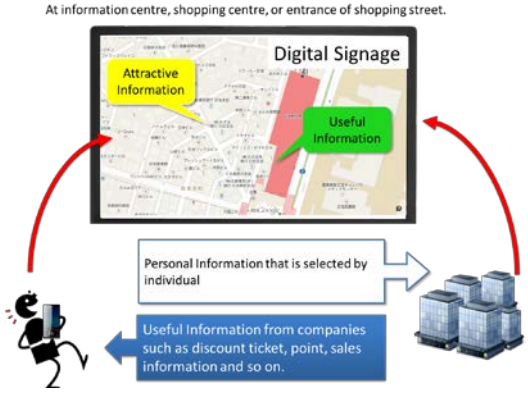
In this section, based on the result, we discussed about developing a new digital signage system based on this framework for handling personal data.

5.1 Overview of application system

Digital signage is an electronic display that shows information, advertisement, map and so on. In these days, we are easy to touch it at station, airport, department store, hospital and so on.

Usually digital signage shows information to us one-sidedly, or people have to search to get useful information. To get useful information for them, it takes a little bit long time and sometime it is getting trouble. And also, sometimes we could not find out and miss what they want to get.

In our idea, the companies that want to give useful information to individuals are able to give personalized information like order-made service by using their personal data under their control. If individual allowed using own personal data and opening it, it would be much easier. It means that they will be able to get personalized useful information even if the first visit at the place for them. It will help their visit to enjoy. Moreover by using digital signage, people will come to the place and take time there. It helps to the company side to visit to their shops directly. (If we do not use digital signage and use only mobile phone on our service, people will not come to the place and take time.)



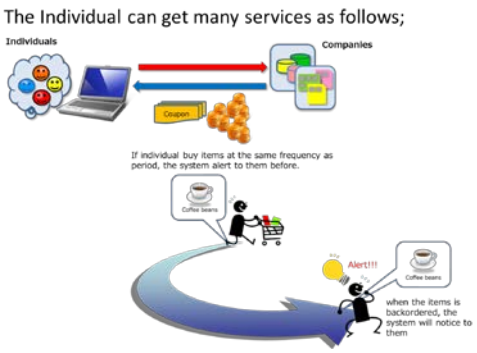


Fig.3 Overview of digital signage application system

Thus, people can get personalized information and services from the digital signage system placed in the public space such as information centre, shopping centre, or entrance of shopping street.

5.2 Template for individual in this system

As based on the result of questionnaire of previous study, figure 4 shows around 60% people do not mind to open their personal data to advertising company except categories of medical expenses and tax. This result means that more than half of people do not mind to open their data to any companies, and also people do not mind to get any advertisement from them. Based on this result, we made a template of that the user can use it for the digital signage system.

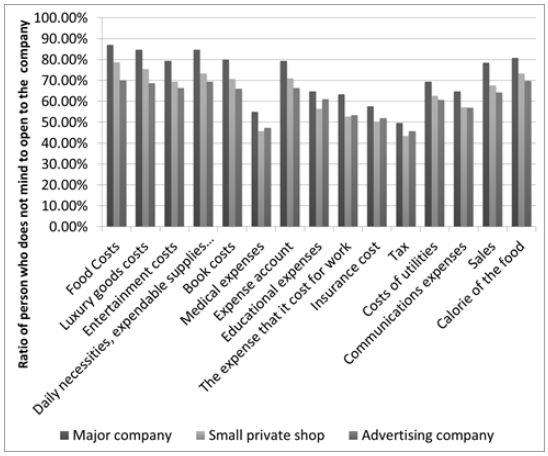


Fig.4 Ratio of person who does not mind to open to advertising company (Differences by company)

In this system, a template shown in Fig 5 is used, so that the user can select the categories of buying information that is given to the advertising company. On Fig 5, vertical scale indicates the level on a zero-to-one scale that individual does not mind to open their information to the companies. (Ex: If individual does not mind to open at all, the rate is 1. If do not want to open at all, the rate is 0.) There are 9 kinds of levels on this; Level 0, level1 -, level 1 +, level 2 -, level 2 +, level 3 -, level 3 +, level 4- and level 4 +. Each level is as follow;

On level 0, individual will not open any personal information to anyone, but they want to use this system. If people want to select this level, people can get only information that is not selected personally from restaurant and shops.

On level 1, the default template is that individual will open only trade name and cost. And also, they will open all categories except medical expenses, insurance costs and tax.

If people want to select this level and they provide their trade name and cost, people can get useful information such as discount ticket, points or coupon from shops and restaurant. For instance, if people bought some pasta, some restaurant, which provide Italian food or have pasta menu, can notice their information and urge them to come to the place. Moreover, if some shops sale it at the same time, they can provide sale information to people directly.

When individual want to select less categories which is different from the default ones, it will be level 1 -, and they want to select all categories, it will be level 1 +.

On level 2, the default template is that individual will open only trade name, cost and date information. And also, they will open all categories except medical expenses, insurance costs and tax.

If people want to select this level and they provide their trade name, cost and date information, people can get useful information such as timely discount ticket, points or coupon from shops and restaurant. Moreover, the restaurants and shops urge them to come their places. For instance, people bought some coffee beans same frequencies, the shops can alert that “it is the time to buy coffee beans, and we can provide a discount ticket!” The companies can provide much more suitable and personalized information to people than level 1.

When individual want to select less categories which is different from the default ones, it will be level 2 -, and they want to select all categories, it will be level 2 +.

On level 3, the default template is that individual will open only trade name, cost and place information. And also, they will open all categories except medical expenses, insurance costs and tax.

If people want to select this level and they provide their trade name, cost and place information, people can get useful information such as discount ticket, points or coupon from nearest shops and restaurants. The companies can provide much more suitable and personalized information to people than level 1.

When individual want to select less categories which is different from the default ones, it will be level 3 -, and they want to select all categories, it will be level 3 +.

On level 4, the default template is that individual will open only trade name, cost, date information and place information. And also, they will open all categories except medical expenses, insurance costs and tax.

If people want to select this level and they provide their trade name, cost, place information and date information, people can get all useful and attractive information such as discount ticket, points or coupon from nearest shops and restaurants timely. And also they can get much more discount, points, and coupon than other levels.

On level 4 +, if people want to select this level and they provide their trade name more than any other levels. The companies can provide best-personalized information to people.

The default is level 1. If individual want to get much more useful information and services from shops and restaurants, they can choose levels, categories, and personal data such as date or place information. If individual get more information, it means that they should open much more personal data to companies.

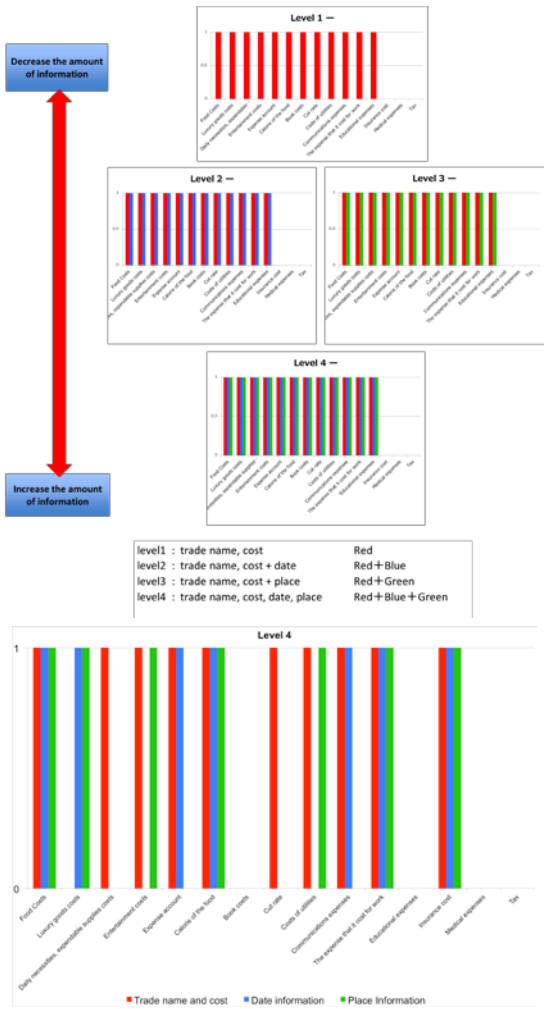


Fig.5 Sample of template for Individual

In 2020, there will be the Olympic Games in Tokyo. Many tourists will come and see many games, and enjoy staying. If tourist can use this system, they will be able to get personalized useful information even if the first stay in Tokyo for them. It will help their stay to be more joyful in Tokyo.

6 CONCLUSION

In this paper, we classify the individual's will for handling buying information based on the questionnaire survey, and propose a template for the self-control of buying information.

With using these template, we suggested the new digital signage system based on the result of questionnaire of previous study, to solve the problems that there is no reasonable way to give our personal data to the companies under our control, we are not able to receive a proper reward from companies, and the companies can hold only limited personal data that is collected by each company.

In next study, we will make a prototype of this digital signage system which using a template for the self-control of buying information, and do demonstration experiment at shopping street.

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