

Mobile Information Service Adapted to Social, Temporal and Dynamic Situational Requirements of Individuals

Pinyapong S., Shoji H., and Kato T.

Abstract— Human thinking may vary according to the situation. Consequently, the requirements also change according to the situation. In everyday life, we find some requirements are changeable such as: cuisine, refreshment. Some requirements are not changeable such as: type of book, movies genre. Furthermore, people often make choices not only based on their personal preference but also opinions or choices of other people such as their companion. From various requirements, we need a service that can provide desired information for the user depending on the prevailing situation on each occasion. In this paper, we have proposed information service adapted to three dimensions of the user requirements which are temporal: short term and long term preference, dynamic: dynamic and stable preference, and social preference: the user and companion preference. This study also creates rules, algorithm to this service.

I. INTRODUCTION

RECENT ADVANCES in wireless communication and hardware technology have made the mobile phone an integral part of our private life. More and more people have started using mobile phone not only to communicate with each other but also to access the information they need from every place and every time. In area of information service technology, many research projects for efficiently finding desired information from large amounts of information have been conducted and consequently some useful tools have appeared. However, it remains a challenge about preference that any user can get desired information in a timely manner anytime and anywhere. The possible reasons for that are as follows:

In everyday life, we find some requirements are changeable such as: cuisine, snack or refreshment. Some requirements are not changeable such as: type of book, movies genre. Additionally, people often make choice not only based on their personal preference but also opinions or choices of other people such as their family or friend. From various requirements, we need a service that can provide desired

information for the user depending on the prevailing situation on each occasion.

In this paper, we have proposed information service adapted to three dimensions of the user preferences. The three dimensions of preferences which are:

1. Dynamic and stable preference: Dynamic preference is a normally changeable preference but different from short term preference. On the contrary, stable preference is not timely change preference.
2. Short term and long term preference: Short term preference holds in exactly one situation or one day, while long term preference generally holds user preference and does not depend on situations.
3. Social preference: Social preference is a preference which is not only based on the user but also based on other people such as family, friend, etc.

II. SOCIAL, TEMPORAL AND DYNAMIC SITUATIONAL REQUIREMENTS

A. Background

In year 2005, we have experiment our prototype system about mobile information service[6] at Odaiba area in Japan. At that time, we found a limitation of this system. They might be caused from various factors such as: the users who were accompanied by one or more friends while the system recommended based on only one personal preference, location, or user's preference that inadequate to changeable situation. To address these problems, we can summarize the cause of factors as follows:

1) *Someone's preference:*

The most of recommendation systems are based on personal preference that means the user who interacts with the system. In practically, a lot of people are going to do activity with their companion. People often make choices not only based on their personal preferences but also taking into account preferences, opinions or choices of other people[3]. For example: Lisa comes along with her friend to looking for a present for her mother, she also wants to hear her friend's opinion that means she would consider about her friend preference. In addition, Lisa wants a present that match with her mother preference. From the example, when searching, people may be not interested in answers matching her preferences, but they might be also interested in answers based on other people: such as Lisa's mother. Consequently,

Manuscript received August 6, 2007.

S. Pinyapong is with the Department of Industrial and Systems Engineering, Chuo University, Tokyo 112-8551 Japan (phone: +81-3-3817-1936; fax: +81-3-3817-1943; e-mail: sineenard@indsys.chuo-u.ac.jp).

H. Shoji and T. Kato are with the Department of Industrial and Systems Engineering, Chuo University, Tokyo 112-8551 Japan (e-mail: hiroko@indsys.chuo-u.ac.jp, kato@indsys.chuo-u.ac.jp).

in this paper we consider about the other preferences such as: family, friend, partner, etc.

2) *Time:*

Time is an important situational factor that is already used in currently available services. Spending time in holiday or weekend of each person is different. If people spends time all day for activity, they may be tired and want to take a break for refreshment or change their schedule depend on the situation. Therefore, the type of preference will be changed up on spending time, activities including schedule. For example table 1 has shown short and long period activities.

TABLE 1
EXAMPLE OF ACTIVITY

Duration	Time	Schedule, Activity
Short period	Afternoon	1. Shopping 2. Stroll 3. Coffee break, talk 4. Dinner
Long period	Late morning	1. Lunch 2. See exhibition 3. Break 4. Stroll, Shopping 5. Other activity (if any time)

3) *Activity history (or log):*

The user’s activity log file is necessary to monitor user’s behavior. Furthermore, it can use to protect duplicated content of recommendation. In previous experiment, we found the users got the same content of recommendation because the system recommended based on one personal preference and same situation. The query of system used the same condition, got the same answer and recommended the same content. In this paper, we consider about user’s activity log and depend on situation that we know about the previous activity of user. After that, the system can choose appropriate activity recommend to the user.

4) *Place:*

The activity place such as: type of place, position as well as a charge of fee resulting to recommendation. For example, Mr.A pay a fee for seeing exhibition, he might spend time more than 1-2 hours. Therefore, place is another factor to be considered.

From above reasons, we can classify preferences into five categories as follows:

1. Dynamic Preference
2. Stable Preference
3. Long Term Preference
4. Short Term Preference
5. Social Preference

We can describe each type as follows:

1. *Dynamic Preference*

If someone asks you about favorite cuisine, your answer is Sushi. However, you cannot eat Sushi everyday or you don’t want to get information about sushi restaurant every time, because you might feel bored. You probably want to know another thing which is also interesting. For that reason, the recommendation about cuisine or refreshment will be

dynamic. We call the preference that need to often change is dynamic preference.

2. *Stable Preference*

A lot of people like to read a book. Some people like novel, cartoon, sci-fi, etc. If they are going to bookstore, they would find the category which their like. The same of movies, people go to the movies because it is a good promotion, a lot of budget, high glossary, famous actor and actress, etc. However, it’s a good movies, but you don’t like that movies genre, you won’t going to see this movies. You want to see movies genre that you delight although a little low budget, not famous actor and actress. Accordingly, the preference that specific for someone in something, not timely changed, we call this preference is a stable preference.

3. *Long Term Preference*

This preference generally holds user preference and does not depend on situations. Long term has a general structure that composed of basic preference such as: age range, gender, hobbies, special interest. Long term is different from stable preference. Stable preference is particular in some products and someone who are fan of them while long term used in general product, not specific.

4. *Short Term Preference*

As a fact of life the user preferences may depend on underlying situations. For instance, users may have different shopping preferences depending on the location they are or on the time of day. In order to integrate such situations into preference, a short term preference has to be developed. Short term preference holds exactly in a current session, one situation or one day. Short term has a temporary structure that can be performed implicitly by observing the user’s behavior and situational information. Additionally, implicit observation does not require any extra time or effort from the user and can adapt to changes in the user’s interests over time.

5. *Social Preference*

From the user activity observation, a lot of people do activity accompanies with their family, friend or partner. People often make choices not only based on their personal preferences but also taking into account preferences, opinions or choices of other people. As a result, when searching, people may be not interested in answers matching her preferences, but they might be also interested in answers based on other people. Consequently, we consider about the other preferences such as: family, friend, partner, etc. that we call this preference is social preference.

From preference’s definition, we can create a rule to give priority to each preference and activities. The example has shown in Table2:

TABLE 2
EXAMPLE PRIORITY OF EACH PREFERENCE

Preference	Gourmet		Shopping	
	Cuisine	Refreshment	Fashion	Book store
Dynamic	○ 3	○ 1	×	×
Static	×	○ 4	○ 3	○ 1
Short term	○ 2	○ 2	○ 1	×
Long term	○ 1	○ 3	○ 2	○ 2

III. SYSTEM FRAMEWORK

Mobile phones are small-sized, which means limited memory and a small monitor. As a result, the system framework uses only necessary data in processing and querying. In this section, we propose a general framework and service as follows:

1. Push service: performs when the mobile phone user arrives at service area.
2. Pull service: performs when the mobile phone user tries to access a mobile service.

A. Algorithms

1. Automatic: System automatically performs about user's task and recommendation.
2. Manual: The user directly access his/her all task to the system.

1) Automatic task:

The process can be described below: (see Fig.1)

1. The user selects task category which they will have activity in the day.
2. The system considers about appropriate preference such as:
 - Person: single, family, friend
 - Item: buy for yourself, buy for other person
3. The system estimates all task and spending time in each task
4. The system considers about priority, appropriate preference for each task, time to take a break and recommends to the user.

2) Manual task:

The process can be described below:

1. The user inputs all tasks that they are going to do in the day.
2. The system considers all tasks and selects appropriate preference such as:
 - Person: single, family, friend
 - Item: buy for yourself, buy for other person
3. The system estimates all task and spending time in each task
4. the system selects
 - a. priority of task to recommendation
 - b. the system considers and recommend a task to users

B. Scenario

Lisa is going to buy a present for her mother. In weekend, she asks her friend go to shopping. She has to buy a present. Afterward, if they have a free time, they would go to shopping for themselves or talking or dinner.

1) Analyze Scenario

The main task is "buy a present for Lisa's mother"

1. The preference of item is Lisa's mother.
2. Lisa going to with her friend.
3. They meet in the afternoon therefore they will spend interval time around 4 hours or half day.

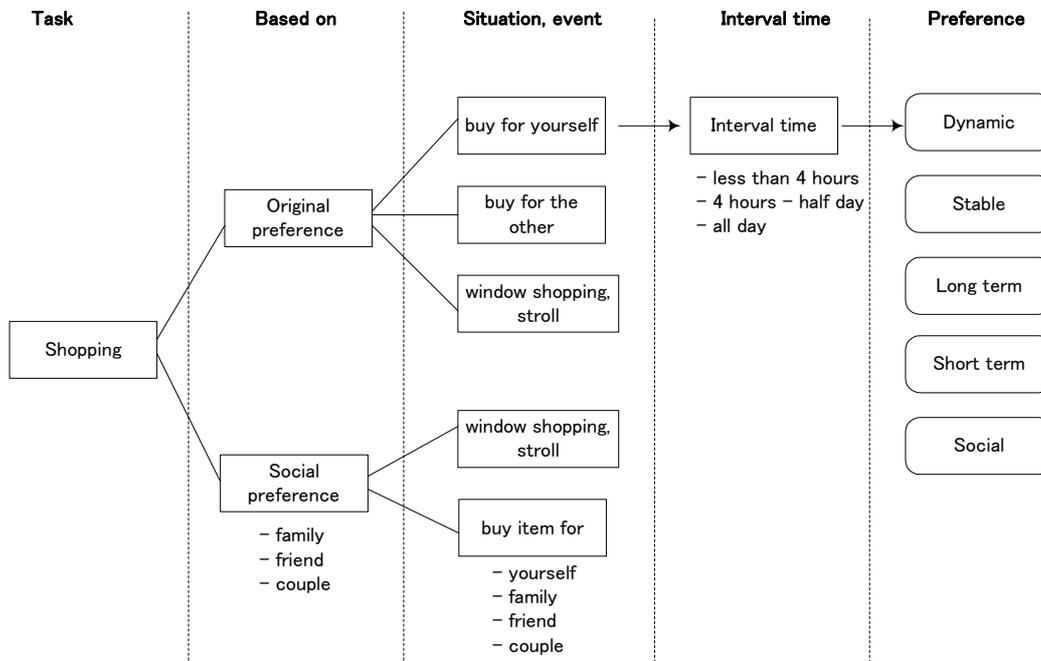


Fig. 1 Example for process

2) *Summary task and preference of use*

1. Shopping for Lisa's mother [social preference]
2. Two persons (with friends relation), going to shopping [Lisa of long term preference, social preference]
3. Coffee break, refreshment, dinner [dynamic preference]
4. Other activity [short term preference]

IV. CONCLUDING REMARKS

In this paper, we have proposed the solution of information service. This paper addresses the requirements change according to the situation. We consider about the possible reason of limitation in previous experiment. Consequently, we can classify preference into three dimensions which are 1) dynamic and stable 2) short term and long term 3) social preference. In addition, we have developed "Pull" service to present appropriate information for the requirements presented by the user and "Push" service to the user who cannot specify their requirements.

We are developing algorithms to process the system. The implementation and experiment are also developing. We are planning to experiment our prototype in September.

There are a lot of challenging issues to be tackled. Our future plans include the study of other ways for the efficient integration of five preferences to filter information. In addition, the study of user's preference model can lead to a good selection of appropriate information service according to situation for the users.

REFERENCES

- [1] T. Kato, "Modeling Individualities of Personal Preferences and Situations via Mobile and Ubiquitous Environment - KANSEI Engineering for Personal Assistance Service," invited talk, HC'2006, Aizu Japan, Sept. 2006.
- [2] H.R. Kim and P.K. Chan, "Learning implicit user interest hierarchy for context in personalization," Proc. IUI 2003, pp.101-108.
- [3] G. Koutrika, "Personalization of Structured Queries with Personal and Collaborative Preferences," Multidisciplinary ECAI'06 Workshop about Advances on Preference Handling, August, 28-29, 2006, Riva del Garda, Italy; pp.65-72.
- [4] M. Morita and Y. Shinoda, "Information Filtering Based on User Behavior Analysis and Best Match Text Retrieval," In Proceedings of SIGIR Conference on Research and Development, 1994, pp. 272-281.
- [5] T. Naganuma and S. Kurakake, "Task Knowledge. Based Retrieval for Services Relevant to Mobile User's Activity," In Proceedings of the ISWC2005, pp. 959-973.
- [6] S. Pinyapong, H. Shoji, A. Ogino, and T. Kato, "Mobile Information Service Adapted to Subjective Situational Requirements of Individuals," IEICE Trans. Inf. & Syst., vol.E89-D, no.6, 2006, pp. 1868-1876.