Personalized Recommendation System for Location Based Service

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Abstract: The location-based service is one of the most powerful services in the mobile area. The location-based service provides information service for moving user's location information and information service using wire / wireless communication.

In this paper, we propose a model for personalized recommendation system which includes location information and personalized recommendation system for location-based service. For this service system, we consider mobile clients that have a limited resource and low bandwidth. Because it is difficult to input the words at mobile device, we must deliberate it when we design the interface of system.

We design and implement the personalized recommendation system for location-based services(advertisement, discount news, and event information) that support user's needs and location information.

As a result, it can be used to design the other location-based service systems related to user's location information in mobile environment. In this case, we need to establish formal definition of moving objects and their temporal pattern.

1. Introduction

The mobile device – mobile terminal and personal digital assistants (PDA) – is available for personalizing, using everywhere and anytime to access. And the device has grown with rapid growth of bandwidth and continuous growth of contents. For that reason, the services in the mobile device became more and more like previous desktop system environments.

In great much information, user want to obtain the necessary information for their object in various of information, and the recommendation system which come up from the effort to supply only necessary information among the number of information to the end user. However, existing recommendation system hasn't considered location-based service. Existing recommendation system not also enough to user needs and related information service.

Mobile device users are supported properly to the spatial and temporal information through location-based service. It is actual and efficient service to end-user.

In this paper, we present about location base service and designe personalized recommender system to push advertising, event information, sale information as data mining techinque and location based service. Our system offer promotion service of personalized item.

And we explain personalized recommendation system for location based service for above information service.

This paper put emphasis on following matters for personalized recommendation system to use user's location information.

- Presentation overall system architecture and its component of perasonalized recommendation system for location based service.
- Creating more effective and accurate information as data mining technique – Relation rule, Classfication - and customer's purchasing history data.
- Utilizing location information in combination with user's taste for more valuable advertising, event, selling(discount) information.

The remainder of this paper is organized as follows. In Chapter 2, we introduce the overall architecture of recommendation system based-on location. We describe mPromterPad which is a engine for personalization of location based service in Chapter 3. Test is performed to evalutate our recommendation system in Chapter 4. Finally, we make conluding remarks and comment on future research areas.

2. Recommendation System for LBS

Personalized recommendation system for location-base service offer marketing information to hidden customer. For there to understand an individual needs and taste there must analysis customer's profile and purchase behavior. And we also use location information of mobile device user to our recommender system, It will be more effective. For these services, we present recommendation system for location based service. Its overall architecture is follow figure 1.
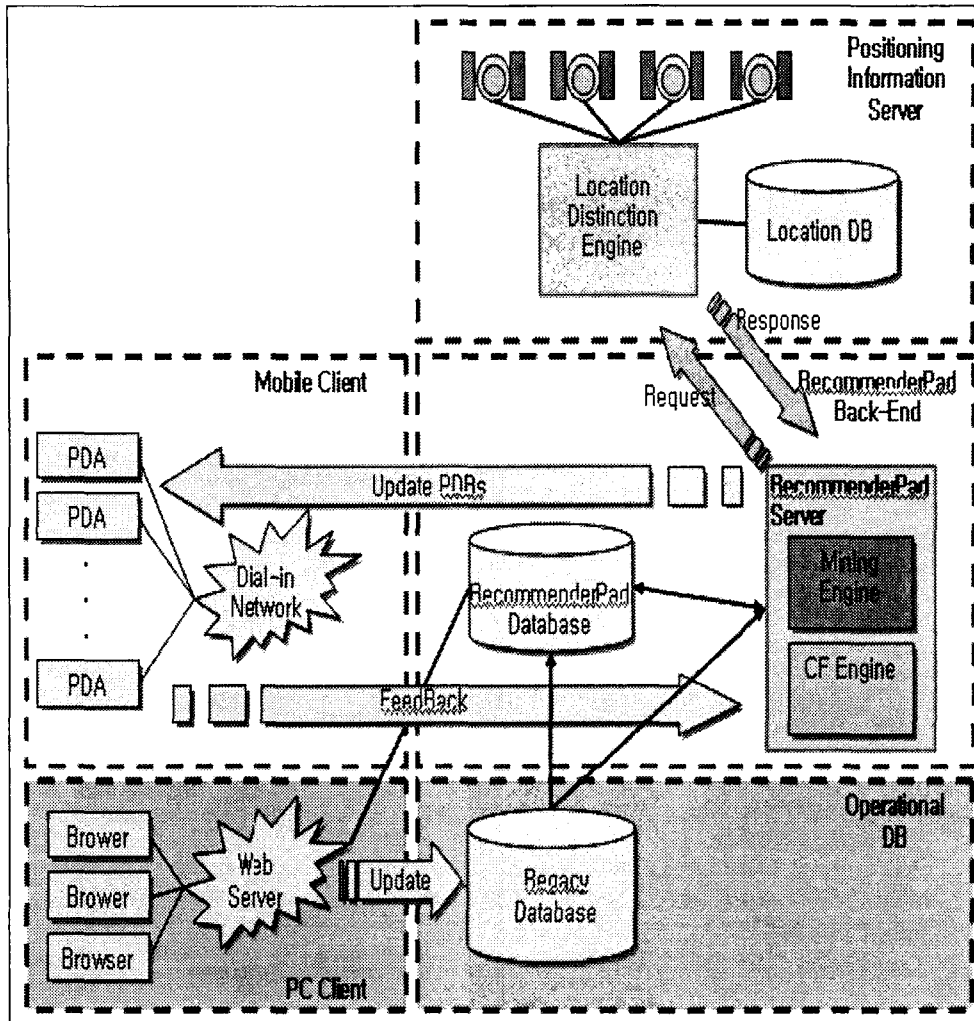
Fig 1. System architecture

Our personalized recommendation system is consist of 5 sub module.

First, GPS Module cover measurement and adjustment of user's location. And PC Client is browsing pc on general desktop pc. The third, OLTP database(operation database) have a general transaction data, customer's profile, customer's purchasing history data. The next, data mining engine is analysis user's needs and taste, and make the recommendation item for the user. Matching engine is make marketing information of Sotre and company with location information. The data mining engine and matching engine is mPromotionPad engine. Finally there is user's mobile client to receive apposite information.

In this paper, we introduce to design mPromtoterPad engine of personalized recommendation system for location based service.

3. mPromoterpad Engine

In this section, we describe the design of mPromoterPad

engine based on location information of user which is the personalized recommendation system for location based service such as advertisement, sale(discount), and event information.

In case of the previous recommendation system or the service of personalized information, it was not easy to create the recommendation list by filtering technique, to discover the relationship between items and the sequence pattern according to time. In contrast, the system suggested in this paper solves the limitation of filtering technique by constructing the system using the data mining technique with the promotion list extraction engine. We also design the system with consideration for the location information which was not considered in the previous system.

mPromoterPad engine consists of three major parts: mPromoterPad database, mining engine, and matching engine. We deal with mining engine and matching engine in this paper.

1) Pormotion of Relational Item

Mining engine system should be able to extract customer information such as customer's needs and withdrawal possible customer and to increase the continuous value of each customer through customer's profile, purchasing history, counsel history, and etc. created from front-end system as a channel operated mutually with customer.

Figure 2 shows the mining engine architecture to create promotion list of product. After customer information and product information are classified by classification technique, the relations between customer and product as well as among products are found using custommer's purchasing history information, and then stored in the relation rule DB.

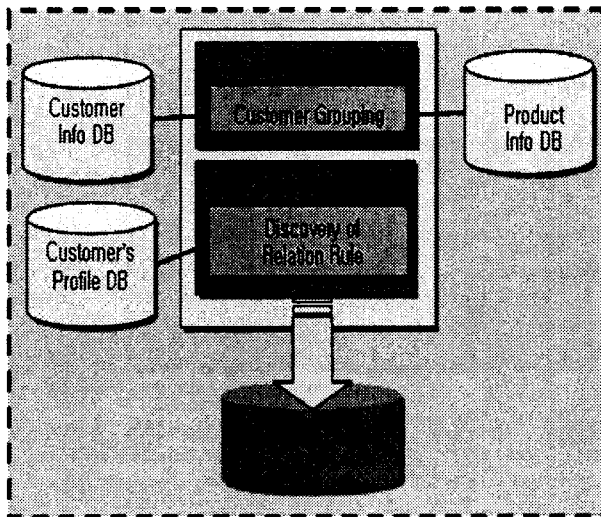## 2) Location-based Information services

Fig 2. Creating Relation rule

Location based information service means wiser service with consideration for user's information rather than information like unilateral advertisement, sale(discount), and event. Our system creates the final information service list by matching user's location information with information such as advertisement, sale(discount), and event of company/store. This role is performed by matching engine.

Matching engine creates more effective and apposite promotion list after considering user's location through matching the relation rule data and the customer profile database created from the mining engine, and advertisement, sale (discount), and event information provided by each company with user's information obtained from GPS system as shown in figure 3.
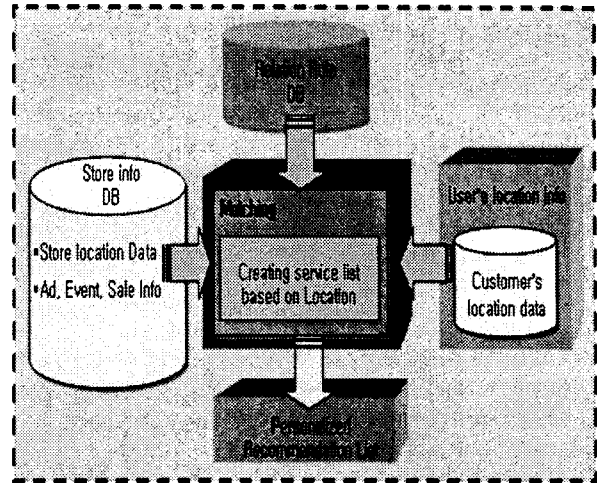

Fig 3. Matching engine for combine with location information

4. Implementaion of System

The following figure 4 is a screen implemented with the Pocket PC Windows 3.0 environment on Compaq iPaq device. Current PDA user name, current login time, and current location address/coordinate are displayed in the screen.
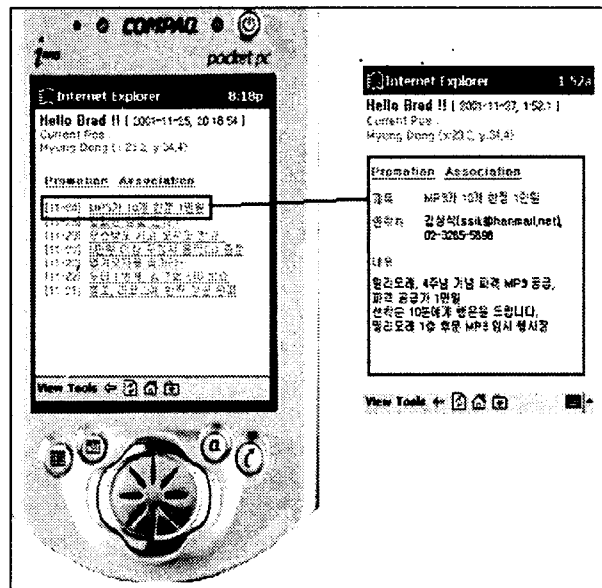

Fig 4. Personalized recommender system

This screen presents recommendation item to user by descending order of recent date if he select association tap. Also, if he selects one item in the recommendation list, product information equivalent to the item is displayed. Using this created information, we can make the system present of itself advertisement, sale (discount), and event information according to the location of PDA

user and the interested area of user. We can also request and verify the information whenever we need it.

We used sale(discount)and event information of shopping mall around Dongdaemoon area to test the system. After user's interested item is stored into PDA, we obtained the result screen which inform user of sale(discount) about his interested item in the area as shown in figure 4.

5. Conclusion

In this paper, we proposed the model for personalized recommendation system which includes location information and personalized recommendation system for location-based service. For this service system, we considered mobile clients that have a limited resource and low bandwidth. Additionally, it is difficult to input the words at mobile device. Therefore, we must deliberate it when we design the interface of system.

We designed and implemented the personalized recommendation system for location-based service(advertisement, discount news, and event information) that support user's needs and location information.

This model we have investigated may provide the basis for numerous further research areas. For example, it can be used to design the other location-based service systems related to user's location information in mobile environment. In this case, we should establish formal definition of moving objects and their temporal pattern.

We can study new data mining techniques enabling to discover temporal pattern from the series of locations of moving objects that have temporal and spatial dimension. To do this, we need to create new algorithms for moving pattern mining.

The useful knowledge for LSB can be discovered by using spatio-temporal approach.

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