Personalization of Digital Contents

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ABSTRACT

In this paper, we present personalization that of important research fields recently. As the interest of individual becomes more diverse, more and more digital contents become personalized. Personalization makes users more satisfied by helping them to use the contents effectively. We discuss the type and the substantial interface of personalization that provides satisfaction to user.

***Keywords**: personalization, user interface, digital contents, multimedia*

1. INTRODUCTION

In recent years, the growth of digital contents has contributes the development of a large number of personalization systems. As customized consumer products become more popular, personalization system keeps the user in good interface of contents that are important to him/her. Personalized digital contents are widely applied when offering goods and services are suitable to the preference of users. In this paper we discuss the structure, types, technology and goals of *personalization*. In chapter 2, we begin with the definition of personalization. In the next chapter, we introduce active and passive personalization, and discuss the advantage and disadvantage of the both strategies. Chapter 4 provides personalized contents and interface. In chapter 5, technology of personalization is discussed that data mining, collaborative filtering, ubiquitous computing, interactive media. Then, chapter 6 summarizes challenges to personalization. Finally we conclude about the topic in chapter 7.

2. WHAT IS PERSONALIZATION?

The number of possible personalization variants seems countless. As with other contents features, a great variety of technologies and systems have been developed and are available in the market, but little or no attention has been paid to the process of modeling and designing personalized contents applications.

Personalization means taking good care of the individual user. However it is a very challenging task. It involves a myriad of different technologies that range from simple programming to complex algorithm.

Kramer et al defined that Personalization is a toolbox of technologies and application features used in the design of an end-user experience.[2] Features classified as 'personalization' are wide-ranging, from simple display of the end-user's name on a contents, to complex catalog navigation.

For example, "desktop avatar" is contents navigator which based on deep model of user's needs and behaviors.

Daniel E. O'Leary coined the phrase "AI Renaissance" in 1997, to describe how artificial intelligence (AI) can make the Internet more usable.[3] Personalization technology is part of that renaissance. The renaissance is referred to witness unprecedented growth in personalization technology companies of commercial world. It is sometimes difficult to find a commonality in technology foundation that spans the breadth of commercial contents offerings in personalization, as well as the broad cross section of emerging efforts in digital markets.

3. PERSONALIZED CONTENTS

The preference, social (or individual) state, and environment of users are very important elements to personalization. As how they are applied, personalization is categorized active personalization, passive personalization. At this point, active personalization relates to preference of users and exchanges needful value with them. By contrast, the passive personalization is executed from restricted condition or predefined environment. The active personalization is further classified into content personalization and link personalization, whereas the passive personalization is categorized context personalization, authorized personalization.

3.1 Content Personalization

When content becomes personalized, the same user interface may present different information according each user. Content personalization provides substantive information in a node, other than link anchors. Personalized of information to meet the user's needs and interest is a very active research area.

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Content personalization usually appears in those areas that filter the information that is relevant for the user, showing only sections and details in which the user may be interested. The user may explicitly indicate his/her preferences, or it may be inferred (semi-) automatically from his/her attitude or from his/her activity. Good method of this strategy is that the user can customize the content and the contents designer makes contents specially. In this way each user navigates only through the information he/she desires, improving the usability of the contents. Otherwise, content personalization occurs when different users perceive different values for the same node attribute. A good example can be found in online stores that give customers special discounts according to their buying history (in this case the attribute price of item is personalized).

3.2 Link Personalization

This strategy involves selecting the links that are more relevant to the user, changing the original navigation space by reducing or improving the relationships between nodes. For example, e-commerce application use link personalization to recommend items based on the clients buying history or some categorization of clients based on ratings and opinions. Link personalization is widely used in bookstore to link the home page with recommendations, new released, shopping groups, etc. Users who give similar ratings to similar contents are presumed to have similar tastes, so when a user seeks recommendations about contents, the contents suggest those that are most popular for his/her class, or those that best correlate with the given contents for that class. [6] The same kind of link personalization is often found in paper review applications. Each reviewer is presented with a set of links to the contents he/she will review, which may have been assigned manually by the "chair" or just computed using a description of the reviewer's expertise.

3.3 Context Personalization

Personalizing navigational contexts is critical when the same information (node) can be reached in different situations. A navigational context is a set of nodes that usually share some property. For example in a Conference Paper Review Application, it is possible to access papers in different contexts such as the whole set of papers, papers that were reviewed by a person, papers in a particular topic, accepted papers, etc. [6] It is noticeable that one paper may appear in different sets and that different users may have different access restrictions according to their role in the Review application

3.4 Authorized Personalization

In the personalized user interface, different users have different roles. Therefore, authorized personalization used in the interface design is a good idea. In this case, different users have different access authorizations. For example, in an academic application, instructors and students have different tasks to perform. Teachers need to access their class schedule to update its contents and students have to access the classes that are available for enrollment, depending on their GPA.

Personalization opens up the possibility of intensive invasion of privacy. According to authorized personalization is very important: personal intrusion by misusing sensitive user's information must be avoided. Thus, the concepts of authorized personalization are critical importance in security oriented personalization. Using authorized personalization in the interface design, any interaction with the resource is performed via specific interface components that present the set of all actions available for the resource and thus contents provide different users with different access rights. Consequently, in order to support the proper authorization decision for secure personalized contents, authorized personalization must flexible and sensitive context access control system.

4. PERSONALIZED INTERFACE

Personalized interface can be defined as mobility or flexibility. This means that the same person may need to have different interface according to his/her device. Even though universal interaction in the personalized design is exacting, it is an important aspect. Since universal interaction uses the same mechanism for different communication devices (such as phones, PDA and desktop computers). This means conveying the same content through different channels by suitably modifying the way it is represented. In this case, personalization allows users to view the information that is relevant to the user and appropriate for the access device. Given the differences in bandwidth among these devices, it is not at all obvious that universal interaction is feasible. On the other hand it is obviously desirable, since it would save us the effort of engineering for each communication channel and each device separately, and ensure the consistency style. In fact, universal interface and dialogue are closely related. For example, whatever can be done in one turn on a desktop computer might require a few turns of phone dialogue or interactions with a PDA. When the bandwidth of a device is low, we have to compensate by increasing the number of turns. There is a great deal of information to be conveyed to or by the user, and dialogue management issues include the information such as what to ask the user and in what order, what information to convey by text, what by voice, and what by picture. The actual interface for each user can be specially constructed for him/her based on geography-specific, user-specific, and style-specific transformations.

5. TECHNOLOGY OF PERSONALIZATION

The goals of personalization technology are clear to user who has individual taste and task by use variety methods.

5.1 Data Mining

Data mining technology is also involved in the design of personalization. This kind of technology may give user power to discover individualized behavior patterns to generate highly accurate personalized information in real-time. These goals are high performance, high quality analytics, flexible and novel representational schema, and real-time application or deployment of the represented knowledge. There are three principle components to

observational personalization: analytics, representation, and deployment. [8] Similarly, web mining provides the tools to analyze Web log data in a user-centric manner such as segmentation, profiling, and click stream discovery. The web server may be carried out through personalization or recommender systems.

5.2 Collaborative Filtering

Collaborative Filtering (CF) is a technology that aims at learning predictive models of user preferences, interests or behavior from community data, i.e. a database of available user preferences. Up to now, the dominant paradigm for performing collaborative filtering in recommender systems has been based on nearest neighbor regression. These systems use a general two-step approach. [7] First users are identified that are similar to some active user for which a recommendation has to be made. Then predictions and recommendations are computed based on the preferences and judgments of these similar or like-minded users.

5.3 Ubiquitous Computing

Personalization in ubiquitous computing environments would depend on detecting user characteristics and preferences in order to services based on these. User preferences may be stored on the user's mobile device, e.g. a PDA, and released in exchange for personalized contents. Contents providers would benefit from being able to provide improved and differentiated services, such as, targeted advertising and loyalty reward programs. Users would benefit from receiving information and services customized to their preferences. For example, a user could walk into a video store and receive information about latest releases in genres of his/her liking along with news about special offers that match his/her viewing preferences. The genre preferences and the user's viewing habits would be stored in a user model on his/her PDA and would form the basis of any personalization offered by the service providers, in this case, the video store.

5.4 Interactive Media

Television has been the most important medium for delivering information and entertainment to consumers for many years. In recent years the World-Wide Web is gradually replacing the TV as the dominant vehicle for information and entertainment distribution. Also, the World-Wide Web technologies can be integrated with traditional television to provide interactive TV. Television is based on broadcasting where the same content is delivered to all viewers at the same time. More and more, web sites begin to offer users ways to define their own profile for personalization. An Interactive video is a subset of interactive multimedia and hypermedia technology where the video content defines the timeline of the presentation and is thereby the driving force. Thus an interactive video system further needs to provide personalization of video content as well as other multimedia objects and hyperlinks.
The Personalization of interactive video framework is based on a personalization model in which sequence elements, hyperlinks, and synchronization points are profiled using vectors of descriptors. The application framework provides the means for the content provider to define the descriptor schemes and the descriptors that will be used for matching the content against the user profile.

The personalization process in interactive system consists of the following steps:[10]

1. The end-user passes an interest profile to the server and selects the interactive video of interest. The interest profile consists of one or more descriptor values for the schemes defined in the system. The user enters the profile by manually selecting the proper values.
2. The server accesses the database to retrieve all the sequence elements and scenes in the video that matches the user's interest profile.
3. The server similarly accesses the database to retrieve all the hyperlinks and synchronization points in the video that matches the user's interest profile.
4. The server determines how many video commercials to insert, selects the proper in-points in the video stream for inserting the commercials, and selects the ones that match the user's interest profile and the content profile.
5. The server generates a table of contents for the personalized version of the video.

A personalized, interactive video system will increase the effectiveness of these videos by allowing users to select the information that may have an impact on their work and responsibilities.

6. CHALLENGES TO PERSONALIZED DESIGN

Generally well-designed interface of personalization is difficult to make than other areas of a system. We more discuss the following challenges of good personalization:

6.1 Different Standards and Requirements

All design involves tradeoffs, but for the following reasons user interface design involves a much larger number of concerns, and they are the purview of widely different disciplines and standards. Many aspects should be considered in a personalized design, such as layouts, colors, icon design, text fonts, internationalization, performance, high-level and low-level details, external factor and legal issues etc.

6.2 Insufficiency of Theories and Guidelines

There are many methodologies, theories and guidelines for how to produce a good user interface. Some of them are very specific, while some of them are quite vague.

6.3 Difficult Iterative Design

One important problem is that the designer's intuition about how to fix an observed problem may be wrong. Some data show that while iterating on a poor design does improve it, iteration never gets it to be as good as an interface that was originally well-designed. Meanwhile, it is quite expensive to do iterative testing.

6.4 Real-Time Programming Requirements

Most personalized need should be corrected instantly, so this causes a set of difficulties for real-time programming. In order to be attractive to users, the programmers must ensure that any necessary processing to calculate the feedback, that can be guaranteed to finish within a short time. This might involve more complicated incremental algorithms. This is a difficult question for designer.

6.5 Low Testability

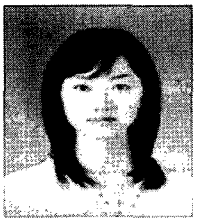
A related problem is the difficulty of testing user interface software for correctness. It is also very difficult to determine whether the user interface has been tested completely since most users have difficulty activities.

7. CONCLUSION

Personalization is still a new research area in interactive system. In spite of some research has been done, personalized interface is still confronting a lot of challenges. It is hard to meet every user's need, since different users have different concerns in terms of different topics. High quality of personalization can be achieved through extensive effort and research on data mining, collaborative filtering, ubiquitous computing, and interface media. Based on these foundation stones, it will be possible to achieve a totally personalization. It is important that knowing preference of user is essential in improving user's interest on the serviced contents.

8. REFERENCES

[1] Murray Turoff, Personalization in user interface, Dec. 17, 2001
[2] Kramer, Joseph et al. "A User-Centered Design Approach to Personalization". CACM, August 2000, Vol. 43 No. 8. PP.45-48, ACM 2000
[3] Maurice D. Mulvenna, Sarabjot S. Anand, and Alex G. Buchner. "Personalization on the Net using Web Mining", Communication of the ACM, August 2000, Vol43, No. 8, PP.123-125
[4] Charu C. Aggarwal and Philip S. Yu, An Automated System for Web Portal Personalization, 2005
[5] Gustavo Rossi, Daniel Schwabe, Robson Guimaraes. "Designing Personalized Web Applications", ACM, 2001, PP.275-284
[6] Chistos K. Georgiadis, Ioannis Mavridis, Athanasios Manitsaris, "Context-Based Humanized and Authorized Personalization in Mobile Commerce Appllications", August 25, 2005
[7] Thomas Hofmann, Collaborative Filtering via Gaussian Probabilistic Latent Semantic Analysis, 2003
[8] Brad A. Myers, "Challenges of HCI Design and Implementation", Interactions, January, 1994
[9] Ajay Brar, Judy Kay, Privacy and Security in Ubiquitous Personalized, July 25, 2005
[10] Rune Hjelsvold, Subu Vdaygiri, Yves Leaute, Web-based Personalization and Management of Interactive Video, May 1-5, 2001 75



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