TV Program Recommender Using User's Preference

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Abstract – Due to the expansion of TV channels in the digital era, the number of TV programs selected by users has had an explosive increase. This expansion makes hard to find preferred TV programs. Because of this, it is necessary to automatically customized recommendation system for TV programs. In this paper, we propose a novel recommendation system to overcome this problem. The proposed recommendation system has two main algorithms that consist of personalized recommendation algorithm and a general recommendation algorithm. The personalized recommendation algorithm is constructed from individual user-information (e.g. channel, title, time, etc) and the other is constructed from personal information (e.g. age, gender, occupation, etc). However if we don't have sufficient user-information regarding the preferences of TV programs then the recommendation has a high failure rate. To overcome this difficulty, we propose the use of a general recommendation algorithm in this paper. In this paper, we address the problems and solutions by describing the proposed algorithms and experiments.

Keywords: TV recommendation, preference, anytime, personalized, general

1. Introduction

TV is the requisite mass media on this society, because it allows us to experience many things that we never experienced before second hand, and it is an entertainment program to relieve our tension when we get tired. Because the were not as many channels in previous broadcasts as the TV programs Included in cable TV and sky wave TV, we could learn our favorite channel number. However, TV offers a variety TV programs and custom broadcasting services to users as the expansion of TV channels in the digital era is resulting in a soaring number of TV programs available to users. In this environment, the broadcast service that answers the demands of users focuses on user and Research on TV program recommendation has been vigorously conducted for 10 years [1, 2].

Based on three months of data from May 1, 2006 to July 31, 2006 received from AGB Nielsen Media Research, we utilized the users' preference analysis for the recommendation of TV programs. We used the first dimensional analysis method among various statistical analysis tools. Data was analyzed using individual viewing TV information, and it is utilized not only in the personalized recommendation method, which recommends in the order of title, genre, and channel information that the user mainly watched on the corresponding weekday and time, but also in the general recommendation method, which uses is used general information such as gender, age, occupation, etc. TV program recommendation algorithms could satisfy the user's preference well through the personalized recommendation algorithm, but when there is not enough viewing information for the corresponding user, the possibility of failure is also increased. Therefore, when the viewing information of a user is not sufficient, we recommended TV programs using the general recommendation method.

The rest of this paper is organized as follows: Section 2 reviews related work in the field. An overview of the software system architecture is given in section 3. Section 4 presents the implementing and simulation result. Finally, section 5 summarizes the paper.

2. Related Work

The recommendation method uses general recommendation and information abstraction method using Data-mining. The general Recommendation method is divided into the Content-based Recommendation (CBR) method and the Collaborative Recommendation (CR) method [3-6].

The content-based Recommendation requires the user to ask questions to the retrieval system and the system shows results to the questions as in Fig. 1 [4, 5].

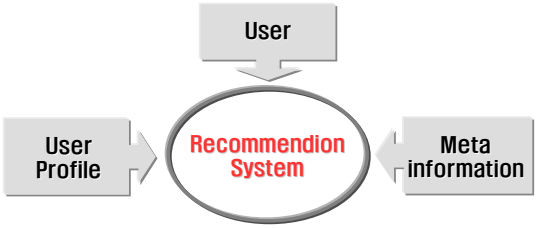


Fig. 1 Content-based Recommendation.

The collaborative Recommendation collects people whose inclinations are similar to the group and recommends programs with assumption that other people also are interested in TV programs that people enjoy within the related group. Such a general recommendation method has problems with the quality of recommendation. The quality drops greatly when we have little user's information data and when there are few

people whose inclinations are similar. We propose a recommendation engine that has a content-based recommendation method and a collaborative recommendation method that mutually supplement each other in order to solve this problem [5, 6].

Data-mining and information abstraction methods bring rules and information using this data; this abstraction process is shown in Fig. 2.

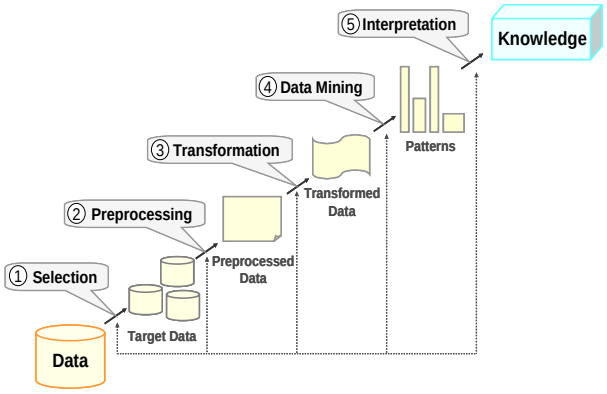


Fig. 2 Data-mining architecture.

Figure 2 shows a typical process in which information is abstracted from data. There are very much technological methods to Data-mining, and there are Data-mining loadmaps that arrange data systematically and bring rules or information effectively from data in Data-mining. A Data-mining loadmap is shown in Fig. 3.

In this paper, we could increase the reliability of the recommendation and optimize the recommendation system by analyzing data from various subjects and domains using a Data-mining loadmap.

3. System Architecture

The proposed software architecture is based on CBR (Content -based Recommendation) and CR (Collaborative Recommendation). The system architecture consists of a User Interface, which receives user information from interactive TV and a TV Program Search Engine, which receives TV program information on the air, from the Recommendation Engine, and from the Database. The system architecture is shown in Fig. 4. Each Recommendation Engine and Database is described in Section 3.a, and Section 3.b.

A. Data Analysis

Table 1 Summary of
the AGB Nielsen Media Research' data

Section	Remark
The number of participant	550 family - 3,953 persons (man : 2003, woman : 1950)
The number of TV program	98,350 (it gather all channel from May, 2006 to July, 2006)
Information of TV viewing	It gather channels and start/end times of individual TV viewing
Genre	94 (overlapping mark is able to do)

Based on three months data from May 1, 2006 to July 31, 2006 received from AGB Nixon Media Research, we utilized users' preference analysis for the recommendation of TV programs. And Table 1 shows a summary of the related data.

The user's Information consists of nine items: gender, age, dwelling form, dwelling area, income, scholarship, etc. This is shown in Fig. 5.

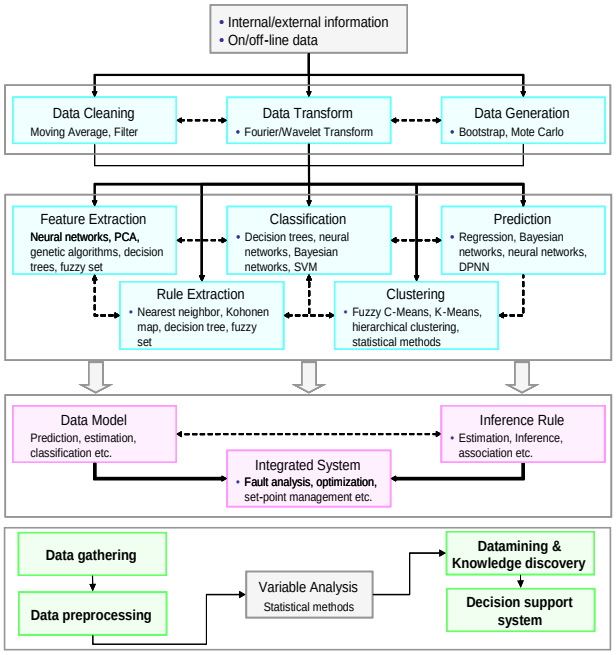


Fig. 3 Data-Mining loadmap.

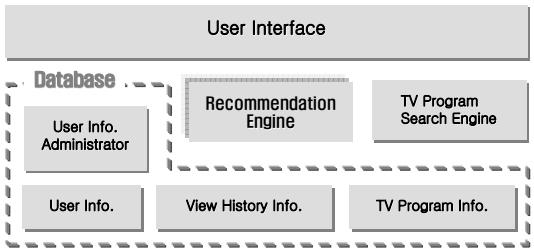


Fig. 4 System architecture.

Genre data from sky-wave TV is separated into three architectures according to each TV program schedule. However, the whole work to standardize the code is insufficient. In the case of cable and satellite broadcasting, doesn't offer to separate information according to each program schedule. In order to solve this problem, we integrate a combination of 94 items according to genre to 13 representative genres and used these on sky-wave and cable TV.

We made a database to analyze the AGB Nielsen Media Research's data. Correlation to each entity is shown in Fig. 6.

We used the first dimensional analysis method among various statistic analysis tools for data analysis. Because the user' information has 9 items, in the case of to extend dimension gradually, the number of case is overfull.

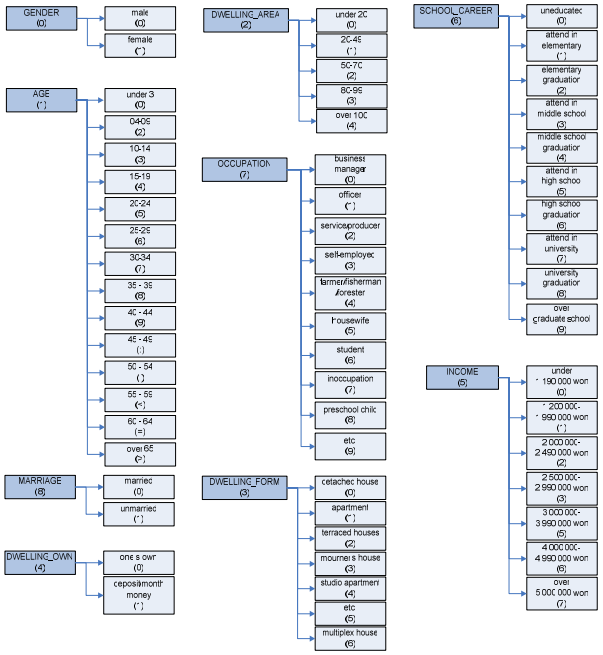


Fig. 5 Code arrangement information connected to information from viewing TV.

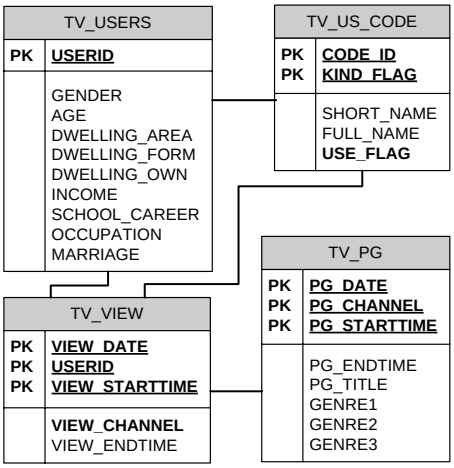


Fig. 6 Entity relation of the AGB Nielsen Media Research' data from viewing TV.

In order to solve this problem, after one dimension analysis, we separated user information items into groups where binary classification is possible and other groups where binary classification is impossible. The results of the one dimension analysis are shown in Fig. 7. Gender, dwelling form, and matrimony can be classified using binary classification according to the results of the one dimension analysis. However, The binary classification method can classify when integrate code according to dwelling form by “Is it apartment?” or “is not it apartment?”. And dwelling area is excepted because there are so many '20 - 49' overwhelmingly.

Age, income, scholarship and occupation reflect personalized inclinations of the user's profile. This paper chooses item in order to reflect individual inclination using binary classification.

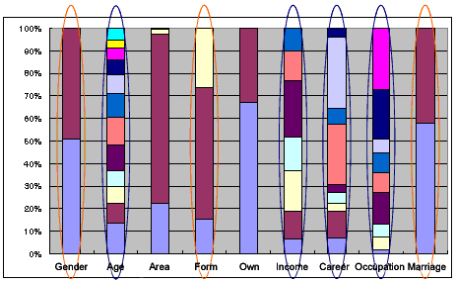


Fig. 7 1D analysis result of viewing TV.

B. Recommendation Engine

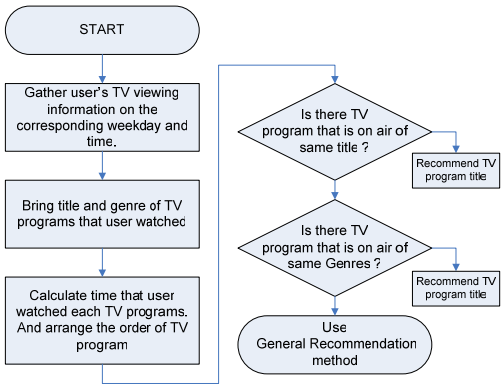


Fig. 8 General Recommendation method.

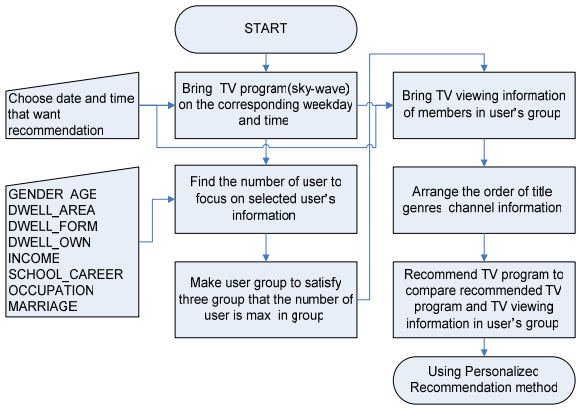


Fig. 9 Personalized Recommendation method.

The recommendation engine consists of CR (Collaborative Recommendation), and CBR (Content-based Recommendation), and supplementation each lacking part. CR (Collaborative Recommendation) and CBR (Content-based Recommendation) are called the general recommendation method and the personalized recommendation method here. The recommendation engine solves the problem of insufficient user' viewing information or can not believe the result. Actually, when we used the personalized recommendation method, we could get a satisfying recommendation result. However, the probability of failure was high when we had little data of user's TV viewing information. In this case, we could recommend TV programs using the general recommendation method, but because the general recommendation method also has a high probability of failure when user's inclination is unique, we

supplemented the methods with each other

The TV program recommendation method must recommend a program to the user based on TV program time and TV program schedules. In this paper, the general recommendation classifies binary classification items and other items, and utilizes them. We divided the group through a combination of binary classification items. And then we created a new subgroup using items that reflect individual inclination according to the group in which it was divided. The general recommendation algorithm is shown in Fig. 8.

The personalized recommendation method of TV programs was analyzed using individual viewing TV information and recommended using the order of TV program title, genre, and channel information that the user mainly watched on the corresponding weekday and time. The personalized recommendation algorithm is shown in Fig.9.

4. Implementation and result

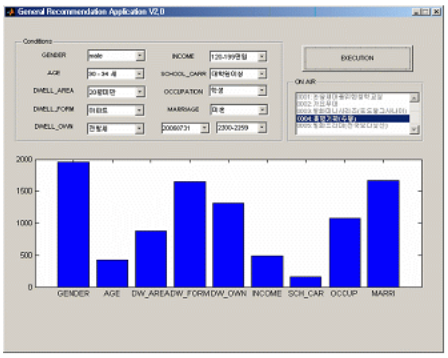
We used MATLAB R2006A GUI in order to embody whole program on Windows 2003 server. We use only use data of sky-wave based on three months data from May 1, 2006 to July 31, 2006 received from AGB Nixon Media Research. And we made a database to interlock DBMS (DataBase Management System) and ODBC (Open DataBase Connectivity) using data of sky-wave. The general TV Program recommendation application described the histogram of a group to similar to user in order to analyze the user's TV viewing information according to the day of the week when the user chooses the date and time that they want a recommendation. In the case of the personalized recommendation application, because the personalized recommendation application analyzes the user's TV viewing information more than the user's general information and recommends using the order of the title, genre, and channel information, we experimented after adding the user's TV viewing information screen. The screen of the general recommendation application and the personalized recommendation application are shown in Fig. 10.

We could get satiable results that compare the results of the General Recommendation and the results of the Personalized Recommendation in order to search the recommendation results.

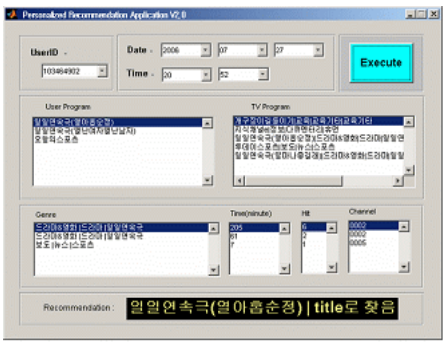
5. Conclusion

We made a database applying the fundamental pretreatment process to resource data. In addition, we arranged each data code in this paper and grasped attribute of data using statistical analysis techniques. The general recommendation method and personalized recommendation method mutuality complement the proposed method, and we had satisfactory results from the experiment.

We are going to improve the integration domain of the recommendation algorithm through continuous research.



a. General Recommendation Application



b. Personalized Recommendation Application

Fig. 10 Application (Korean language).

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