Application of Recommendation System for National R&D Outcome Information

Dong-Ho Shin*, Mi-Sun Kim**, Byeong-Hee lee***, Jae-Soo Kim****
*,**Korea University of Science and Technology, ***,****KISTI, Korea
E-mail : E-mail : zikan@naver.com*, omisuns@gmail.com, bhlee@kisti.re.kr, jaesoo@kisti.re.kr

1. Introduction

At present, due to the global competition centering science and technology, advanced countries are allocating a massive proportion of their budgets to research and development (R&D) in response. The Korean government has also been increasing its R&D expenditures to maintain its national competitiveness. Korea is presently undergoing an important transition in which technological innovations are brought upon by the cutting-edge R&D projects and investments of the government and government-funded research institutes, universities and industries. Accordingly, the government, in an attempt to enhance the efficiency of the innovation activities and national R&D investments, is operating the National Science & Technology Information Service (NTIS). In this study, development and introduction of a recommendation system was proposed as a means to enhance the utilization of the information on national R&D outcomes provided through NTIS.

2. Preceding Research

The widespread use of the Internet and IT advancements resulted in the creation of a vast pool of information; however, this has also made it more time- and effort-consuming to obtain the desired information from the extensive sources. In order to reduce the time and effort, a recommendation system has been set in place in a wide range of fields. For instance, companies are employing a recommendation system to provide information according to user preferences, thereby attracting more customers and increasing the sales of their products and services. One of the recommendation systems in use today is collaborative filtering, a method of making automatic predictions regarding the interests of users based on the information collected on the preferences or taste information of many users. Patterns are determined based on the preferences of users, and items are recommended to users exhibiting similar patterns.

A preceding study aimed to raise the efficiency of search performed on NDSL to obtain information on research outcomes such as research papers and patents. Rather than focusing on the volume of data, it aimed to raise the efficiency of research by enabling researchers to invest as little time as possible in acquiring the necessary information on previous research outcomes. For this reason, the researchers of this study asserted that the approach taken by companies, which use recommendation systems for the purpose of increasing sales, should not be applied to R&D information services [1]. In this study, a recommendation system was applied to the National Science & Technology Information Service in operation by Korea Institute of Science and Technology Information (KISTI).

3. Information on NTIS

Majority of the members registered for NTIS provided by KISTI are universities, government-funded research institutes, and researchers working in the industrial sector, who comprise 77.3% of all memberships. This suggests that the services provided by NTIS are mostly used by researchers. At present, information provided through the R&D outcome information service of NTIS includes the following: R&D outcomes collected from the 8 major institutions designated by the Ministry of Science, ICT and Future Planning (MSIP) to manage R&D outcomes; R&D outcomes (research papers, patents, royalties (incl. licensing fees), commercialization) collected through studies and analyses of national R&D projects; outstanding government R&D outcomes and technologies recommended by the government ministries for utilization and dissemination; and information on the technology market obtained from other institutions.

4. Application of Collaborative Filtering System

A survey was conducted with the service users to examine the economic impact of NTIS. User satisfaction with the “Reduced time of search for research ideas” was highest among other questionnaire items at 3.64 out of 5 points, but this was considered below standard. This section explores the measures to reduce the time it takes for users to obtain research ideas using NTIS by applying a recommendation system.

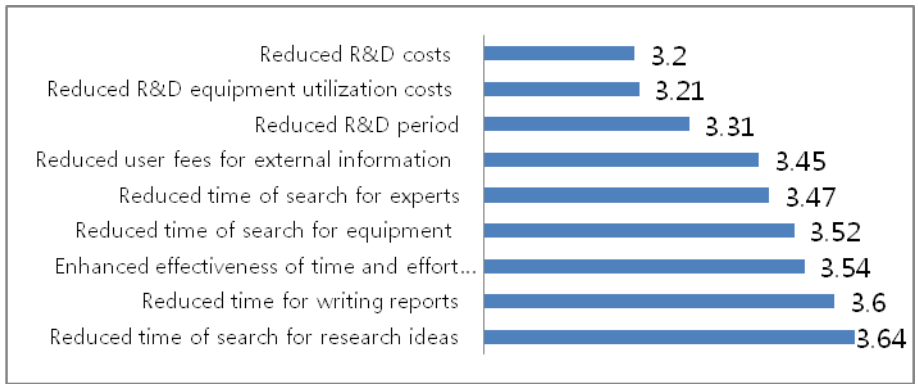

Figure 1. Economic impact of NTIS (for researchers)

Of the recommendation systems, the most widely used technique of item-based collaborative filtering is proposed for NTIS. Item-based collaborative filtering is the most commonly used recommendation system. It estimates the level of similarity, in the same manner as the user-based filtering technique, to recommend items. The advantage of this technique is that the accuracy of the recommendation is heightened through the accumulation of data as diverse associated data are generated on each of the items.

If this type of recommendation system were to be applied to the R&D outcome information service of NTIS, the user patterns would be analyzed based on the information provided at the time of membership registration with the information on the items clicked on or downloaded by users in order to measure the degree of similarity. It has been reported that item-based collective filtering is advantageous for online services in terms of performance and expandability, and generates outstanding recommendation results [9]. However, search patterns are expected to vary depending on the type of user and thus, the item-based collaborative filtering technique should be applied only after performing filtering based on the user type determined based on the user information in order to improve user satisfaction.

5. Conclusion

This study proposes the measures to enhance the utilization of the national R&D outcome information service provided through NTIS by applying the item-based collaborating filtering technique, which is one of many recommendation systems used in various fields today. Application of a recommendation system is expected to reduce the time it takes to search for research ideas and to facilitate access to the national R&D outcome information service for not only researchers but also the general public with an interest in R&D. The limitations of this study are that an actual recommendation system was not developed and algorithm for each technique was not presented. Nevertheless, application of the recommendation system proposed in this paper will make it easier for researchers to search for and retrieve the necessary national R&D information, and this will present an appropriate direction for the development of the national R&D outcome information service.

6. References

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