Research Paper Recommender System for University Students on the E-Book System

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ABSTRACT

This paper shows a research paper recommender system for university students. The recommender system is embedded in an e-book system, which displays learning materials (e.g., slides) and is used at lectures. The recommender system suggests papers related to a learning material. The experiment revealed students do not access to recommended papers during the lecture. Instead, they access to research papers when reviewing the lecture and/or working for an assignment.

CCS CONCEPTS

• Information systems → Recommender systems; • Human-centered computing → E-book readers; • Applied computing → Digital libraries and archives;

KEYWORDS

recommender system, e-book, computer supported learning

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1 INTRODUCTION

So far, a lot of works have developed research paper recommender systems for researchers to assist in finding information. In contrast, this paper proposes a research paper recommender system for university students. The recommender system is embedded into an e-book system BookRoll [2], which displays learning materials (e.g., slides, textbooks) during lectures. It suggests research papers related to a learning material at which a student looks. The motivations of the development are two-fold: (i) Although undergraduate students are interested in research, they have almost no opportunity to know them in lectures. The recommender system provides opportunities to see how what they learn is connected with research. (ii) University libraries operate institutional repositories including research papers. Due to the recent spread of open access policies, the number of research papers in the institutional repositories has increased.

2 RECOMMENDER SYSTEM

As an initial step, we implement a research paper recommender system for students on an e-book system BookRoll. BookRoll is a web application that displays learning materials. The recommender system suggests research papers related to a learning material at which a student looks. Due to copyright concerns, we cannot mine full texts of research papers. Thus, we mine the research papers using only their titles. As a text mining method, we employ HCF-IDF [1], which performs well for mining titles of research papers. Research papers that have highest similarity scores to a learning material are recommended. Figure 1 shows the interface of the recommender system embedded in BookRoll.

3 EXPERIMENT

We conduct an experiment to measure how many times and why students access to recommended papers.

Figure 1: Research paper recommender system on the e-book system BookRoll.

We recommend research papers in the institutional repositories, in order to connect education (i.e., lectures) with research (i.e., research papers) in universities.
Question | n | Result
--- | --- | ---
Q1. Are you interested in scientific research? (1: not at all – 5: very much) | 44 | 3.36 (1.17)
Q2. Are you interested in contents of the lecture on 12/13/2017? (1: not at all – 5: very much) | 44 | 3.57 (0.93)
Q3. Did you notice that related papers were shown at the right side of BookRoll? (Y/N) | 44 | 56.8%
Q4. If you answer yes for Q3, did you access to recommended papers? (Y/N) | 25 | 48.0%
Q5. If you answer yes for Q4, why did you access? (check at least one reasons) | 12 | 25.0%
Because it seems interesting.
Because it seems useful for the assignment.
I clicked without knowing why.
Q6. If you answer yes for Q4, did you find interesting and/or useful papers? (Y/N) | 12 | 75.0%
Because it seems unrelated to the contents of the lecture.
Because I have no interest.
Because I have no time.
Another reason
Q7. If you answer no for Q4, why did not you access? (check at least one reasons) | 13 | 23.1%
Because it seems unrelated to the contents of the lecture.
Because I have no interest.
Because I have no time.
Another reason
The result of the survey is summarized in Table 1. It shows students are fairly interested in research and the lecture (Q1 and Q2). Only 56.8% of students noticed that research papers are recommended (Q3). Thus, we need to improve the interface of the recommender system. Among students who noticed recommended papers, 48.0% of them accessed (Q4). 75.0% of students with accesses answered recommended papers were interesting or/and useful (Q6). Most reason for the access is to find useful information for the assignment (Q5). The reasons why students did not access are various (Q7). 23.1% of students without access answered that recommendations included papers unrelated to the learning material. Since research papers in the institutional repository cover many disciplines, it was difficult to retrieve only research papers about human interface in the computer science. For example, the recommender system picks a research paper about human interface in medicine. In the future, we will exploit information such as authors’ affiliations (e.g., department) for improving the recommendation strategy. In free comments, we receive positive comments such as the recommender system enables to access research papers easily.

5 CONCLUSION AND FUTURE WORK
In this paper, we show a research paper recommender system for students on the e-book system BookRoll, which connects research and education in universities. In the future, we will assess how recommended papers influence on learning activities using logs recorded by BookRoll. Then, we will develop a recommendation strategy that suggests research papers, which stimulates students’ learning activities.

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REFERENCES