Methodologies, Effectiveness and Use of
Book Recommender Systems in Libraries:
An Annotated Bibliography

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INFO522: Information Access & Resources
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June 9, 2010
Introduction and Scope

The following bibliography covers the methodology, effectiveness, and use of book recommender systems in both physical and digital library environments. Recommendation systems emerged in the mid-1990’s as the digital resources grew rapidly, and librarians and researchers struggled with the problem of information overload (Adomavicius & Tuzhilin, 2005). These systems build upon prior research in the areas of data mining and collaborative filtering. The scholarly articles selected were published between 2002-2010 and discuss recommender systems from the United States, Germany, Belgium, Taiwan, and Italy. Only articles published in English were used. Multiple sources beyond LIS were consulted including LISTA, Web of Science, and Google Scholar. Many of the articles are extremely technical in nature. I endeavor to communicate the concept of the recommendation system’s methodology rather than detail of the complex mathematical algorithms used.

Description and Purpose of Recommender Systems

Smeaton & Callan (2005) define recommendation systems as a particular type of personalization that learns about a person and then proactively identifies and recommends information that meets their needs. Recommendation systems are valuable when they identify information a user was previously unaware of (Smeaton et al., 2005). All live implementations of
recommendation systems that I researched were integrated with the library’s online catalog.

Recommendation systems can be broadly divided into three categories (Adomavicius et al., 2005 & Hwang et al., 2003):

Content-based recommendation – where a single user will receive recommendations based only on their own ratings of books from past borrowing or simply from past browsing activity in the online catalog. Content-based systems recommend items similar to those a user liked in the past. This approach has its roots in information retrieval and information filtering research.

Collaborative recommendations – where a single user will receive recommendations based on the similar tastes and preferences of other users of the library. Amazon.com is a commercial site that utilizes item-to-item collaborative filtering as do several scholarly databases such as Emerald Abstract and ACM.

Hybrid – This method combines the above two categories.

All of these types of systems have various advantages and disadvantages that are discussed in the literature review. In annotating journal articles, I included which type of system these researchers proposed and tested/deployed.
The purpose of a recommendation system is to improve the service quality and borrowing rate of the digital library (Chen C. & Chen A., 2007). It can also be a catalog enrichment tool or a substitute for traditional subject classification (Monnich & Spiering, 2008). As a byproduct, a recommendation system can also help in the development of a library’s holdings since library staff can analyze recommendation versus usage patterns (Monnich et al., 2008). Neumann et al. (2008) believe that scientific libraries in particular can benefit from using such systems based on the potential to reduce transaction costs for literary searches. Quite simply, a result from a recommendation system is understood as a recommendation, an option worthy of consideration; a result from an information retrieval system is interpreted as a match to a user’s query (Porcel et al., 2009).

**Literature Review**

**Recommendation Methodologies**

There are a variety of mathematical and statistical methodologies used in recommendation systems in general. All systems though use some form of data mining technique. Chen et al. (2007) use association rules, clustering, and the ant colony optimization algorithm (ACO). Other models use “nearest neighbor” (cosine, correlation), a similarity algorithm based on the Levenshtein algorithm (d’Acierno et al., 2009), and a preference score algorithm (Liao et al., 2009).
The Virtual Museum recommendation system for multimedia objects (paintings) developed by d’Acierno et al. uses both human-created annotations about the objects (m-Tree indexing) and painting analysis (color, texture, and shape). Beginning with each user’s browsing session, their behavior is analyzed real-time as they browse through the online virtual museum. No historical user preferences or user profiles are captured or used. The authors acknowledge this as a pitfall. When a user starts browsing the collection, their current pattern is too short to make a useful recommendation based on usage pattern only (d’Acierno et al., 2009).

Heylighen & Bollen’s (2002) proposed methodology using Hebbian algorithms for associative networks is also based on the idea to extract metadata not from the content of the document but from the pattern of document usage.

Many of the journal articles debated whether to base recommendations on actual items borrowed versus items viewed in the digital library’s online catalog. Liao et al. implemented the PORE (personal ontology recommender) system for NCHU university users in Taiwan and based their recommendations on user’s actual borrowing records. Neumann et al. (2008) and others believe that since lending data is highly biased due to the potential non-availability of documents already checked out (and the fact that reference documents cannot be checked out), better user data is derived from catalog browsing behavior.

User Profiles versus Privacy
Recommendation systems vary greatly in their approach to user profiles versus the need for privacy where one’s borrowing history is not uniquely identified or recorded. One the one hand, Hsu et al. (2009) create user profiles for Taiwanese high school students in order to document their English skills and their particular areas of interest (e.g., art, fashion, geography, history, science). That recommendation system then delivers appropriate English language articles to stimulate young readers. At the other end of the spectrum, Germany has strict privacy laws, and the BibTip system collects and stores only anonymous data (Monnich et al., 2008). The RecoDiver system also used in Germany is based on anonymous user observations (Neumann et al., 2008). In the United States, the public has demonstrated repeatedly that they are willing to give up a degree of privacy in exchange for a specific benefit (Smeaton et al., 2005).

**Types of Content**

In the commercial space, recommendation systems have focused on virtually any type of product a consumer can put to their shopping basket -- with Amazon.com being a prime example. In the academic space, the focus has been on books / articles / journals / thesis – all digital text. An exception is the Virtual Museum system built by d’Acierno et al. (2009) in Italy that focuses on the unique problem of recommending multimedia objects by combining browsing system methodology with a recommendation methodology (similarity algorithm). Several researchers mention the need for expanding their models to include multimedia data objects like audio, video, and graphics.
User Interfaces

In the German RecoDiver system, Neumann et al. (2008) claim to have developed a breakthrough user interface for presenting recommendations to users. They believe that no other existing interface to digital libraries visualizes the relevance between documents based on recommendations. The RecoDiver system uses a radial tree layout to visually locate related documents (related nodes) to the original searched document (the main node). The nodes are represented as book cover art and outlined in green (available), yellow (waiting list), or red (unavailable). This approach differed from all other systems that use lists to display results. User interface is an area that Smeaton et al. (2005) believe is essential for future research rather than being treated as an afterthought and merely “bolted onto a system last”.

Recommendation Effectiveness

There are a variety of methods proposed and used to evaluate the effectiveness of the different recommendation systems. BibTip in Germany asked users to vote on the quality of the recommendation system using a 5 point scale with 5=very good. After one year of use, the average user rating was 4.21 (Monnich et al., 2008). Neumann et al. (2008) also gauged the usability of the RecoDiver system in Germany with a questionnaire to the 31 students and researchers who used the test system. The final result was 87% satisfaction. There was even a survey question about the user interfaces: BibTip (list-based)
versus RecoDiver (radial tree layout). Not surprisingly, Neumann et al. (2008) believe that RecoDiver’s dynamic graphs enhance “common” list-based recommendation services.

For the Virtual Museum system, the evaluation was performed by testing the automated system versus human experts. Sample queries included: “Find any image related to Baroque”, “Find images with a preponderance of red color”. The system delivered recommendations in 1-2 seconds, but the authors acknowledge that scalability may be an issue as a significant number multimedia objects are added to the database. The test system contained only 100 paintings.

There’s clearly more work that needs to be done in the area of evaluating effectiveness of recommendation systems. Hwang et al. (2003) published a paper where their recommendation system (the Electronic Thesis and Dissertation System) tested in Taiwan was only capable of recommending 10% of the entire set of documents in their database. This poor result promoted some further academic research and a follow up paper one year later. Both articles are included in this annotated bibliography (Hwang et al., 2004).

Key Challenges/Future Research

In addition to measuring effectiveness of recommendation systems, a few key challenges present today are:
**New Article Problem**: When a new document is added to a digital library, it has no browsing or borrowing history. Therefore, many researches explored ways to compensate for this in their recommendation systems. (d’Acierno et al., 2009)

**New User Problem**: The ‘cold start problem’ is mentioned in several journal articles (Adomavicious et al., 2005 & Liao et al., 2009). A new user in a content-based recommendation system is unable to obtain any results because they themselves have never rated any of the items or checked out any books to build a borrowing history.

The main areas mentioned for future research are better user modeling, better personalization, scalability, user interaction, funding for large scale testing (a barrier to entry for new research groups), and privacy (Smeaton et al., 2005). With the rapid growth of digital information available online, recommendation systems for digital libraries are critical for meeting users’ needs and wider adoption is likely.
Bibliography

Entry 1:


**Abstract:** This paper presents an overview of the field of recommender systems and describes the current generation of recommendation methods that are usually classified into the following three main categories: content-based, collaborative, and hybrid recommendation approaches. This paper also describes various limitations of current recommendation methods and discusses possible extensions that can improve recommendation capabilities and make recommender systems applicable to an even broader range of applications. These extensions include, among others, an improvement of understanding of users and items, incorporation of the contextual information into the recommendation process, support for multi-criteria ratings, and a provision of more flexible and less intrusive types of recommendations.

**Annotation:** This article provides an excellent introduction to recommendation systems beginning with a classification scheme (content-based, collaborative, or hybrid) to understand the different approaches. A table also clearly shows the current research in the field by scheme. Mathematical support is included, but all concepts are clearly explained in layman's terms. Real world examples are mentioned where appropriate (e.g., Amazon and MovieLens use collaborative filtering for their book and movie recommendation systems respectively). In general, there are a broad variety of sophisticated mathematical techniques employed for recommendation systems and benefits and limitations to all of them, but the authors believe that the hybrid approach (combining content and collaborative approaches) is more accurate than each of the others alone. Both authors are PhDs in Computer Science and are widely published.

**Search Strategy:** After using commercial databases to find many articles, I decided to try Google Scholar which was mentioned in the Week 10 lecture.

**Database:** Google Scholar

**Method of Searching:** keyword and then browsing of results

**Search String:** recommendation systems
Entry 2:


**Abstract:** Purpose – Since library storage has been increasing day by day, it is difficult for readers to find the books which interest them as well as representative booklists. How to utilize meaningful information effectively to improve the service quality of the digital library appears to be very important. The purpose of this paper is to provide a recommendation system architecture to promote digital library services in electronic libraries.

Design/methodology/approach – In the proposed architecture, a two-phase data mining process used by association rule and clustering methods is designed to generate a recommendation system. The process considers not only the relationship of a cluster of users but also the associations among the information accessed.

Findings – The process considered not only the relationship of a cluster of users but also the associations among the information accessed. With the advanced filter, the recommendation supported by the proposed system architecture would be closely served to meet users’ needs.

Originality/value – This paper not only constructs a recommendation service for readers to search books from the web but takes the initiative in finding the most suitable books for readers as well. Furthermore, library managers are expected to purchase core and hot books from a limited budget to maintain and satisfy the requirements of readers along with promoting digital library services.

**Keywords** Digital libraries, Data collection, Electronic document delivery, Libraries, Cluster analysis, Programming and algorithm theory

**Paper type** Research paper

**Annotation:** This article describes a proposed architecture for implementing a real-time book recommendation system for a campus digital library. The system is based on two data mining techniques: clustering algorithms and ‘association rules’. Library loan records are examined and clustered according to ‘some characteristic’ of the readers. The authors use the Ant Colony Clustering Algorithm to form clusters. (Note: In a nutshell, real ants are capable of finding the shortest path from a food source to their nest, and they communicate with others by exploiting pheromone information.) Once clusters of readers are defined, the borrowing records of each reader are examined using association rules and access behavior. Loan records are examined, and each reader’s loan records are serially linked over a period of at least 3 months. The methodology then uses association rules as the data mining technique to discover similarities among user’s interests and book borrowing behavior.

This article’s strength is in the literature review of data mining and the discussion of a design methodology and approach that is backed up by a detailed
mathematical overview of the Ant Clustering Optimization Algorithm. The weakness is in the ‘findings’ area where the authors state that this system will ‘meet user’s needs.’ This is a proposed methodology and, despite having a section titled ‘Implementation’, there is no evidence in the article that this methodology was ever actually tested or implemented in a campus digital library with success in terms of confidence and effectiveness. The article also states that the proposed methodology could also be used for recommending books from the web, but this is not really explored convincingly.

**Search Strategy:** Controlled vocabulary terms from the LISTA thesaurus. I looked for the term ‘recommender systems’ and found that ‘recommender systems (information filtering)’ was actually in the thesaurus.

**Database:** Library, Information Science & Technology Abstract (LISTA)

**Method of Searching:** EBSCO interface using keyword search for thesaurus term

**Search String:** recommender systems (information filtering)

**Entry 3:**


**Abstract:** In this paper, a recommendation system for browsing large multimedia repositories is presented. In particular a combinations of image processing algorithms and user behavior features is designed, implemented, and tested. Several experiments from a virtual museum scenario are carried out and discussed.

**Annotation:** This is the only journal article in this bibliography that proposes a recommendation methodology for multimedia objects – specifically digital reproductions of paintings in a virtual museum (digital library). The article contains a detailed mathematical discussion of how to model image similarities based on color, texture, and shape and deliver recommendations based on a pattern comparison algorithm. The system was built and tested with a data set containing 500 paintings of different artistic movements. System recommendations compared favorable versus human recommendations.

**Search Strategy:** After using commercial databases to find many articles, I decided to try Google Scholar which was mentioned in the Week 10 lecture.
Database: Google Scholar

Method of Searching: keyword and then browsing of results

Search String: recommendation systems

Entry 4:

Abstract: This paper proposes a set of algorithms to extract metadata about the documents in a digital library from the way these documents are used. Inspired by the learning of connections in the brain, the system assumes that documents develop stronger associations as they are more frequently co-activated. Co-activation corresponds to consultation by the same user, and decreases exponentially with the time interval between consultations. The strength of activation is proportional to the user's interest for the document, either evaluated explicitly, or inferred implicitly from user actions or the duration of the consultation. Co-activation values are added, producing a matrix of associations. This matrix can be used to recommend the documents that are most strongly related to a given document, most relevant to the user's implicit interest profile, or most interesting to users overall. Moreover, it allows the calculation of document similarity values, which in turn can be used to cluster similar documents. The data needed to feed such a recommendation system are readily extracted from the usage logs of document servers, and can be processed either in a centralized or a distributed manner.

Annotation: This is a fairly technical journal article. It proposes a general approach to the pitfalls of keywords and metadata by extracting metadata not from the content of the document but from the pattern of document usage. The mathematical technique (associative networks) is inspired by the functioning of the brain. It was Hebb in 1967 who stated that concepts or neurons in the brain are connected through variable strength associations (or synapses) whose strength evolves according to “the rule of Hebb”. This article introduced the element of time between related document usage as a factor in making recommendations (e.g. recommendations can weaken over time). This was a new concept not discussed in other articles. The author is a Belgian cyberneticist, and research professor at the Vrije Universiteit Brussel, the Dutch-speaking Free University of Brussels.

Search Strategy: I decided to try citation searching using the following article (Entry #2) as a starting point:

I searched by author name (CHEN CC) and the date of publication (2007) to locate the Chen article in Web of Science. I did a backward citation search and picked out this journal article by Heylighen.

**Database:** LISTA via Web of Science

**Method of Searching:** Footnote chasing

**Search String:** Referenced in:

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**Entry 5:**


**Abstract:** In a language curriculum, the training of reading ability is one of the most important aspects. Previous studies have shown the importance of assigning proper articles to individual students for training their reading ability; nevertheless, previous experience has also shown the challenges of this issue owing to the complexity of personal factors as well as the diverse properties of the candidate articles to be taken into consideration. This study proposes a knowledge engineering approach for developing reading material recommendation systems by eliciting domain knowledge from multiple experts.
Experimental results on 29 senior high school students show that the developed system is able to provide expert-like recommendations to the students by taking preferences and knowledge levels of individual students as well as categories and traits of articles into consideration.

**Annotation**: This journal article described an English book recommendation system (articles rather than books, actually) for senior high school students in Taiwan. English proficiency is strongly polarized in that country leading to difficulty in teaching English to students with varying levels of knowledge and motivation. After describing the mathematical approach to the problem, the authors performed a real world test of their system on 29 students using 92 articles in their recommendation system. They followed the test with a survey of the student participants – 80% of whom stated that the recommended articles appealed to them. This article clearly outlined a real world problem and showed how a recommendation system assisted teachers and students in accomplishing their educational goal. The authors are academics from the National University of Taiwan.

**Search Strategy**: Leverage the fact that the phrase ‘recommendation system’ resulted in good articles using other search methods in other databases.

**Database**: ERIC [Dialog File 1]

**Method of Searching**: Keyword searching (using proximity operator)

**Search String**:  
? begin 1  
? s recommendation(w)system  
2881 RECOMMENDATION  
114144 SYSTEM  
S9 6 RECOMMENDATION(W)SYSTEM  
? t 9/9/all

null
9/9/1  
DIALOG(R)File 1: ERIC  
(c) format only 2010 Dialog. All rights reserved.

0012586548 ERIC Number: EJ877994

**Development of a Reading Material Recommendation System Based on a Knowledge Engineering Approach**  
Hsu, Ching-Kun; Hwang, Gwo-Jen; Chang, Chih-Kai  
8 pp.  
Computers & Education v55 n1 p76-83 Aug 2010  
August 2010 (20100800)  
ISSN: 0360-1315  
**Available From**: Elsevier. 6277 Sea Harbor Drive, Orlando, FL 32887-4800. Tel: 877-839-7126; Tel: 407-345-4020; Fax: 407-363-1354; e-mail: usjcs@elsevier.com; Web site:
Entry 6:

Abstract: This article describes a service for providing literature recommendations, which is part of a networked digital library project whose principal goal is to develop technologies for supporting digital services. The proposed literature recommendation system makes use of the Web usage logs of a literature digital library. The recommendation framework consists of three sequential steps: data preparation of the Web usage log, discovery of article associations, and article recommendations. We discuss several design alternatives for conducting these steps. These alternatives are evaluated using the Web logs of our university’s electronic thesis and dissertation (ETD) system. The proposed literature recommendation system has been incorporated into our university’s ETD system, and is currently operational.

Annotation: This journal article is valuable because it describes a small, but operational, book recommendation system at a university in Taiwan and includes results. The thesis database (ETD) contains 3000 records. The article is quite detailed in discussing the mathematical approaches used, and in several area, the authors recommend more than one approach. The authors clearly define and label 4 hypotheses they prove with the system. After reading this article, I realized that the Emerald Abstract database from Emerald Insights has a similar recommendation feature and user interface to the one used at ETD. One pitfall of their system is that it fails to recommend independent articles that are seldom accessed along with other articles. As such, only 10% of the total ETD collection is “recommendable”. More work is proposed to expand this scope. The authors are academics at National Sun Yat-sen University, Taiwan.

Search Strategy: Look for articles using different keywords to describe the concepts of recommendations systems.

Database: Library Literature & Information Science (LLIS) [Dialog File 438]
Method of Searching: Keyword searching using proximity operators and Boolean logic in Dialog.

Search String:

? begin 438

? s data(w)mining and digital(w)libraries

6590 DATA
389 MINING
217 DATA(W)MINING
6829 DIGITAL
87192 LIBRARIES
547 DIGITAL(W)LIBRARIES
S2 4 DATA(W)MINING AND DIGITAL(W)LIBRARIES

? t 2/9/all (2 of the 4 records were good hits)

Entry 7:


Abstract: In a large-scale digital library, it is essential to recommend a small number of useful and related articles to users. In this paper, a literature recommendation framework for digital libraries is proposed that dynamically provides recommendations to an active user when browsing a new article. This framework extends our previous work that considers only Web usage data by utilizing content information of articles when making recommendations. Methods that make use of pure content data, pure Web usage data, and both content and usage data are developed and compared using the data collected from our university’s electronic thesis and dissertation (ETD) system. The experimental results demonstrate that content data and usage data are complements of each other and hybrid methods that take into account of both types of information tend to achieve more accurate recommendations.

Annotation: This journal article is interesting because it describes the follow up effort to correct the poor results of low coverage (only 10% of articles “recommendable”!) from the initial implementation of the ETD thesis recommendation system in Taiwan. This is a very technical article, dense with mathematical theory, that proposes to add content-based and hybrid recommendation techniques to improve the performance metrics (e.g., precision and recall). The content categories chosen are: thesis title, thesis abstract, keywords, and university advisor name. So, in addition to Web usage logs, the content of the articles is now factored into a recommendation. The clustering
approach called feature partitioning (FP) resulted in 100% recommendable articles (Table V).

**Search Strategy**: Look for articles using different keywords to describe the concepts of recommendations systems.

**Database**: Library Literature & Information Science (LLIS) [Dialog File 438]

**Method of Searching**: Keyword searching using proximity operators and Boolean logic in Dialog.

**Search String**:

? begin 438

? s data(w)mining and digital(w)libraries

6590 DATA
389 MINING
217 DATA(W)MINING
6829 DIGITAL
87192 LIBRARIES
547 DIGITAL(W)LIBRARIES
S2 4 DATA(W)MINING AND DIGITAL(W)LIBRARIES

? t 2/9/all (2 of the 4 records were good hits)

**Entry 8**:


**Abstract**: Purpose – As library collections increase rapidly, personalized recommender systems have become a very important service for library patrons. The purpose of this paper is to design and implement a personal ontology recommender (PORE) system by building personal ontologies based on patrons’ borrowing records.

Design/methodology/approach – In the PORE system, the traditional cataloging scheme, classification for Chinese libraries, is used as the reference ontology. This reference ontology is transformed to a unique personal ontology for each user based on the mining results from library borrowing records of that user.

Findings – A personal ontology represents a unique user interest on specific subjects. The personal ontology can be used to filter out unsuitable recommendations based only on a keyword matching method. Besides, the recommended books can be organized into the personal ontology, and provide the patron with a user-friendly interface to access library collections.
Research limitations/implications – The PORE system is currently implemented for Chinese collections. From this paper builds a new version to support English collections by adopting the Library of Congress Classification as the reference ontology.

Originality/value – This paper represents a practical method of building a user’s personal ontology and explains the functional use of ontology knowledge.

Keywords Customer service management, Information systems, Taiwan, Digital libraries

Paper type Research paper

Annotation: This journal article describes a fairly large (206,000 records) book recommendation system launched in 2007 at the National Chung Hsing University (NCHU) library in Taiwan. 51,454 users accounts and 663,619 borrowing records were present in 2007. The personal “ontology” refers to a profile made up of interest topics and keywords automatically mined from a user’s library borrower records. The Chinese equivalent of the LCC called CCL is used as a reference ontology or classification system for the books. The approach used for this system is content-based (using the user’s own borrowing records only). A weakness of this article is that it does not contain any empirical evidence that the PORE system is accurate. The authors do acknowledge that there is still a problem for new users with no borrowing history (They get no recommendations from the system!), and intend to pursue this in the future. The article has five authors (all Taiwanese) from various backgrounds, but the article is dominated by mathematical formulas and approaches. More real work results would have been nice.

Search Strategy: Look for articles using different keywords to describe the concepts of recommendations systems.

Database: Library Literature & Information Science (LLIS) [Dialog File 438]

Method of Searching: Keyword searching using proximity operators and Boolean logic in Dialog.

Search String:

? begin 438

? s information(w)filtering

60166 INFORMATION
613 FILTERING
S7 20 INFORMATION(w)FILTERING

? s s7 and libraries

20 S7
87192 LIBRARIES
S8 1 S7 AND LIBRARIES
PORE: a personal ontology recommender system for digital libraries

Liao, Shu-Chuan
Kao, Kuo-Fong; Liao, I-En; Chen, Hui-Lin; Huang, Shu-O
The Electronic Library ( Electron Libr ) v. 27 no3 (2009) p. 496-508 2009
ISSN: 0264-0473 Language: English
Record Status: Corrected or revised record

Descriptors:
Recommender systems (Information filtering); Information systems -- Taiwan; Ontology (Information science)

Company Names: National Chung Hsing University -- Library

Entry 9:


Abstract: Recommender systems are useful tools for adding a reference component to a library catalog, and they help develop library catalogs that serve as customer-oriented portals, deploying Web 2.0 technology. Recommender systems are based on statistical models, and they can lead users from one record to similar literature held in the catalog. In this article we describe the recommender system BibTip, developed in Karlsruhe University, and we discuss its application in libraries.

Annotation: This article is a high-level overview of the BibTip recommendation system that was developed in 2007 at Karlsruhe University in Germany and is now being used at more than 9 other major universities in that country. This system is uses a content-based approach looking at a user’s browsing activity in the library catalog as well as a statistical evaluation of usage data (multiple users?). The issue of privacy is discussed for the first time as all data stored and processed is anonymous in this system (Germany subject to strict privacy laws). BibTip is available commercially and positioned as a value-added feature for a library catalog. Another new idea mentioned is that the system can assist librarians in analyzing usage patterns in support of future book acquisitions. The primary author is the head of collections and cataloging at Karlsruhe University Library.
Search Strategy: After using commercial databases to find many articles, I decided to try Google Scholar which was mentioned in the Week 10 lecture.

Database: Google Scholar

Method of Searching: keyword and then browsing of results

Search String: recommendation systems

Entry 10:


Abstract: Various kinds of recommendation services open to the general public have recently been integrated into the website of the University Library of Karlsruhe as a test bed for information providers and e-commerce alike. This contribution reports on the development of RecoDiver, a graph-based user interface for behavior-based recommender systems. A Java applet integrated into the library’s online catalog dynamically displays recommended further documents in a clickable graph centered around the document of interest to the user. A local view of the complete graph of recommendations is presented in a radial tree layout based on a minimum spanning tree with animated graph transitions featuring interpolations by polar coordinates to avoid crisscrossings. Further graph search tools like a selectable histogram of years of publication are available as well. This article portrays the user interface as well as the distributed web service architecture behind it and features an evaluation by user surveys showing the preference of users compared to the common lists of recommended items.

Keywords: Recommender system, user interface, consumer buying behavior, real-world application

Annotation: This is an excellent and original article that describes a new user interface for presenting recommendations (books, articles) to users. Most recommendation systems deliver their results in a list, but the authors developed a system that delivers results in dynamic graphs to inform the user about the connection between various recommended items. This system was build and installed at Karlsruhe University in Germany in 2007. The user interface uses a radial tree layout to give a sense of how closely related two documents are. Excellent screen shots are included.

Search Strategy: Controlled vocabulary using thesaurus term.
Database: Library, Information Science & Technology Abstract (LISTA)

Method of Searching: EBSCO interface using controlled vocabulary

Search String: 'recommender systems (information filtering)

Entry 11:


Abstract: The Web is one of the most important information media and it is influencing in the development of other media, as for example, newspapers, journals, books, and libraries. In this paper, we analyze the logical extensions of traditional libraries in the Information Society. In Information Society people want to communicate and collaborate. So, libraries must develop services for connecting people together in information environments. Then, the library staff need automatic techniques to facilitate so that a great number of users can access to a great number of resources. Recommender systems are tools whose objective is to evaluate and filter the great amount of information available on the Web to assist the users in their information access processes. We present a model of a fuzzy linguistic recommender system to help the University Digital Libraries users to access for their research resources. This system recommends researchers specialized and complementary resources in order to discover collaboration possibilities to form multi-disciplinary groups. In this way, this system increases social collaboration possibilities in a university framework and contributes to improve the services provided by a University Digital Library. Keywords: Recommender systems; Fuzzy linguistic modeling; University Digital Libraries

Annotation: This highly complex journal article focuses on a recommender system for an academic university environment where the users are researchers. The proposed system is a hybrid-based approach relying on a librarian to store basic information about the new resource (book) in the system as well as collaborative filtering to generate recommendations for new users without any prior history (“cold start”). A great amount of detail is included on the mathematical modeling behind the proposed system. A very small trial (10 users) was performed to validate the proposed system with average precision, recall, and F1 metrics at 63%, 67%, and 65%, respectively. The authors call this “good performance”, but I'm not sure this test of 10 users is statistically significant.

Search Strategy: After using commercial databases to find many articles, I decided to try Google Scholar which was mentioned in the Week 10 lecture.
**Database:** Google Scholar

**Method of Searching:** keyword and then browsing of results

**Search String:** recommendation systems

**Entry 12:**


**Abstract:** Widespread use of the Internet has resulted in digital libraries that are increasingly used by diverse communities of users for diverse purposes and in which sharing and collaboration have become important social elements. As such libraries become commonplace, as their contents and services become more varied, and as their patrons become more experienced with computer technology, users will expect more sophisticated services from these libraries. A simple search function, normally an integral part of any digital library, increasingly leads to user frustration as user needs become more complex and as the volume of managed information increases. Proactive digital libraries, where the library evolves from being passive and untailored, are seen as offering great potential for addressing and overcoming these issues and include techniques such as personalisation and **recommender systems**. In this paper, following on from the DELOS/NSF Working Group on Personalisation and **Recommender Systems** for Digital Libraries, which met and reported during 2003, we present some background material on the scope of personalisation and **recommender systems** in digital libraries. We then outline the working group’s vision for the evolution of digital libraries and the role that personalisation and **recommender systems** will play, and we present a series of research challenges and specific recommendations and research priorities for the field. [ABSTRACT FROM AUTHOR]

**Annotation:** This article is a broad overview of the topics of personalization and recommendation systems and represents the findings of research jointly funded by the DELOS EU FP5 Network and the National Science Foundation International Digital Libraries Initiative in 2003. It describes the key features, strengths, and weaknesses of the two main areas (personalization and recommendations systems) and includes recommendations for future research to advance the progress in this field of study. It brought up several new topics such as the use of Global Positioning Systems (GPS) to guide recommendations delivered via portable devices from mobile digital libraries. The article digresses a little to talk about personal digital libraries, but overall is well written and focused on the high level issues facing recommendation systems rather than detailed mathematical models.
**Search Strategy:** Controlled vocabulary using thesaurus term.

**Database:** Library, Information Science & Technology Abstract (LISTA)

**Method of Searching:** EBSCO interface using controlled vocabulary from thesaurus

**Search String:** 'recommender systems (information filtering)'
Conclusion and Personal Statement

There is no shortage of academic research in the area of digital library recommendation systems. The research field is truly global in scope. There was a large amount of scholarly material to choose from. I tried to select times journal articles that represented a variety of perspectives on the topic. My search strings in Dialog were very basic. I was fortunate to find the thesaurus term ‘recommendation systems (information filtering)’ early in my searching efforts. Probably the best way to find articles in this very technical and global field is via footnote chasing/citation searching. The Adomavicious article alone (published in IEEE Transactions on Knowledge and Data Engineering) had 112 footnotes! Due to the more technical mathematical nature of many these articles, many appeared in computer-related journals (Expert Systems with Applications, Online Information Review, AI Communications, etc.) versus scholarly library journals.

I loved reading about the radial tree format to display recommendations visually. I think this model could be really groundbreaking for libraries if implemented on the new Macintosh iPAD tablet.

I enjoyed the exercise and hope my annotated bibliography encourages readers to want to learn more about this exciting field. I tried to present the high level concepts for recommendation systems and not get bogged down with all the mathematical details.