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A Survey on Book Recommendation Systems

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ABSTRACT

The act of reading has edges for people and societies, nonetheless studies show that reading declines, particularly among the young. Recommender systems will facilitate stop such decline. This research aims at studying various techniques for recommending books in the library system.

Keywords: Machine Learning, Recommendation system, Content-based recommendations, Cooperative recommendations, Demographic recommendations, Hybrid recommendations

INTRODUCTION

Recommender system gain information regarding the user using totally different ways and sources to predict that user needs and advocate things in keeping with this analysis processes results. Recommender engine software system provides a prediction regarding what we'd prefer to get, listen or watch. Various recommendation techniques are:

- Content-based recommendations
- Cooperative recommendations
- Demographic recommendations
- Hybrid Approaches.

Content-based recommendations:

Content-based filtering ways are grounded on a item description and user's interests. It also recommends things almost like those that a given user has liked within the item rate list. Indeed, the content-based system performs the operation of matching the user's details like age, gender, location and the rated item list on the positioning hold on in his account with the similar things have a standard specification, so as to recommend new things meets his/her interests. The content-based recommendation method steps:

● Content analyzer:

When information has no structure some reasonably pre-processing step is required for extracting relevant structured information. The first responsibility of the element is to gift the content of things like, documents, Web pages, news, product descriptions, etc. returning from information sources during a kind suited to the subsequent process steps. Data things are analyzed by feature extraction techniques in order to shift item illustration of the original information area to the target one. This agency is that the input to the profile learner and filtering element.

● Profile learner:

This model constructs a user profile by grouping user preference knowledge and tries to generalize this knowledge. Normally, the generalization strategy is accomplished through machine learning techniques that are ready to perceive an honest example of user interests, ranging from things likeable or disliked within the past. For illustration, the profile learner of an online page recommender will implement a relevance feedback methodology during which the training technique combines the positive and negative example's vectors into a prototype vector representing the user profile. Training examples are sites on that positive or negative feedback has been provided by the user.

● Filtering element:

This model uses user profile to search out matching things related to the item list, however new product and gives this new item to the user – a generated list of probably attention-grabbing items. The matching is accomplished by using the trigonometric function similarity between the example vector and also the item vectors.

Cooperative recommendations:
Collaborative filtering based mostly systems collect and analyzes user's behavioral info within the form of their feedback, ratings, preferences, and activities. Grounded on this information, then exploits similarities amongst many users or items to predict missing ratings and thence build appropriate recommendations. cooperative filtering (CF) ways produce user-specific recommendations of things supported patterns of ratings or usages like purchases while not the demand for knowledge regarding either things or users. If person P1 likes object O1, O2, O3 If person P2 likes object O1, O3, O4 If person P3 likes object O1? And so there's a high likelihood that person P3 could like object O3 because, from the primary 2 statements we have a tendency to knew that person P1, P2, P3 likes object O1.

Demographic recommendations:
This technique of advice system uses user profile info like age, gender, demographic space, education, interests, and their opinion regarding rating things and find the common users have similarity rating things and interests of divide users by age bracket and living space.

Hybrid Approaches:
In a hybrid approach, we have a tendency to merge the 2 counseled techniques content-based and cooperative filtering to induce the best advantage and gaining higher result and scale back the problems and challenges of those applications. Hybrid approaches have multi-methods.

- **Weighted:**
We have a tendency to combine numerically each recommend element given a unique score by the system.

- **Switching:**
The system has multiple decisions of different recommendation item to the user.

LITERATURE REVIEW

[1] This paper proposes a simple comprehensible system for book recommendations that help readers to recommend the correct book. In recent years, data analysis challenge has been centered on for the administration recommendation system. For shoppers, network assets square measure utterly joined and quickly developed. The planned method works on coaching, feedback, management, reporting, configuration, and exploitation it to supply helpful data to the user in order to assist in decision-making and knowledge item recommendations.
They have used a User based mostly cooperative Filtering (UBCF) approach and measured the performance of similarity measures in recommending books to a user. The planned system's overall architecture is introduced and its implementation is delineating with a model style.

[2] Book recommendation system has been developed rapidly because of the net technology and library modernization, which provide a replacement means for the librarians to amass the readers' demands. However, existing recommendation systems can't provide enough info for readers to choose whether or not to suggest a book or not, and that they don't analyze the recommendation info. Some systems conjointly lack of a feedback mechanism for readers, which might hurt their enthusiasm. So as to unravel these issues, they designed a novel book recommendation system.
Readers are redirected to the advice pages once they can't realize the required book through the library list retrieval system. the advice pages contain all the essential and increasing book info for readers to seek advice from. Readers will suggest a book on these pages, and the recommendation information is analyzed by the advice system to create scientific getting call. They planned two formulas to reason the value and replica range respectively supported the advice information. The application of the advice system shows that each the recommended book utilization and readers' satisfaction were greatly exaggerated.

[3] Typically the book recommended by most of the websites isn't of the buyer's interest. Generally several data and proposals are pushed to consumers; however most of these are not relevant. This paper presents a brand new approach for recommending books to the consumers. This method combines the options of content filtering, cooperative filtering and association rule mining to produce economical and effective recommendations.

[4] This paper recommends prime 10 hierarchal books on totally different disciplines of applied science. The opinion mining techniques area unit applied on the client reviews. The customer's reviews area unit obtained just by common question terms to go looking engines for various books of various disciplines of applied science. Querying the books generates numerous books detail and opinion of those books will easily be far-famed exploitation question for reviews.

These reviews area unit analyzed and checked with those options of books, which a user sometimes like to have. once employing a ranking system, books area unit hierarchal in downward-sloping order of their ranking points.

[5] This analysis applied association rule technique to identify relationship between books that the users have an interest in and therefore the availableness of books within the system in accordance with book classes. This might facilitate the users once searching for books, and provides higher looking results. The book recommendation system not solely increased effectiveness of library system however additionally helped scale back price of keeping. Additionally, it expedited users once ransacking through a large range of books on shelves and will develop users' reading habit.

[6] Recommender Systems are around for more than a decade currently. Selecting what book to scan next has always been an issue for several. Even for college kids, deciding which textbook or book of facts to scan on a subject unknown to them could be a massive question. In this paper authors have given a model for a web-based customized hybrid book recommender system that exploits varied aspects of giving recommendations except for the regular cooperative and content based filtering approaches. Temporal aspects for the recommendations area unit incorporated. Conjointly for users of various age, gender and country, customized recommendations will be created on these demographic parameters. Scraping information from the online and mistreatment data | the knowledge | the data} obtained from this method will be equally helpful in creating recommendations.

[7] In this paper author proposed a book recommendation web service that using collaborative filtering provides users with recommendations on different genres based on the information of their preferences which they provide while making registration. The advantage of this system is in its speed and simplicity. Most of the existing services need a profile history information and other information that need some time to provide users with recommendations while our aim was to generate recommendations for users in a very quick way.

[8] The recommendation system in this analysis uses the Item based mostly cooperative Filtering methodology, wherever this methodology is that the results of combining cooperative Filtering and Item based mostly. Collaborative Filtering uses the rating matrix to calculate ratings, and Item based mostly uses book attributes to calculate similarity attributes between books. The cooperative filtering methodology has been used with success in many applications. The Collaborative Filtering methodology predicts user preferences for things in an exceedingly word-of-month manner, i.e. user preferences area unit determined by considering opinions within the type of preference ratings. Based on the results of tests conducted, the minimum MAE generated by the system is zero.018 with a maximum accuracy of ninety 99.63% contained within the 1st test, that means that the additional variable information rating information, the higher the MAE price generated.

[9] This system produces a listing of books' recommendations to the readers supported the interest of library readers. Users' interest points area unit calculated by user borrowing history info through cooperative filtering algorithm. This recommendation system solely provides recommendation services to registered users. Usually, if the system doesn't get the non-public info provided by users, users won't be able to acquire the simplest info service. When browsing the system, users will record their browsing records directly into the information. Registered users can get the result of recommendation list generated by the system once logging in relying on an oversized variety of books info, user information, borrowing books info within the library, the user CF and Item CF algorithmic program area unit combined to finish the personalized recommendation update.

The data export module is employed to import user borrowing information and books info keep within the books database into the system memory during a mounted format, and the data processing isn't any longer obsessed with the present server. The books classification module is employed to pre-process all types of borrowing information and user information, and classifies the borrowing information according to the categories in the library. The books recommendation module recommends specific books to the readers according to the readers' interest points. The recommendation system module reads the information of the borrowed books from the books database and generates the recommended books to the borrowing users.

[10] This analysis presents the method of book recommendation by victimization the collaborative filtering (CF) for university students. The CF technique composes of similarity calculation, prediction and recommendation. In our experiments, matrix resolving technique is additionally adopted to resolve exiguity of rating matrix. Different techniques of similarity calculation are compared. Book recommendation of every student has been generated by using existing borrowing records with time stamp.

Table -1: Literature Review Table

Sr. No.	Paper	Best Technique	Other Techniques Tested	Dataset	Performance Parameter
1.	Machine Learning based Efficient Recommendation System for Book Selection using User based Collaborative Filtering Algorithm [1]	Collaborative filtering using Constrained Pearson Correlation as similarity measure	Collaborative filtering using, 1. Cosine Similarity, 2. Pearson Correlation Coefficient, 3.Constrained Pearson Correlation, 4. JACCARD Similarity Measures on TAG matrix	Kaggle good reads data set	Recall, F1 Score, Mean Absolute Presidion
2.	An Online Book Recommendation System Based on Web Service [2]	Web Service	×	Langlang bookstore, Dangdang bookstore	Pareto curve
3.	Book Recommendation System Based on Combine Features of Content Based Filtering, Collaborative Filtering and Association Rule Mining [3]	Combination of content filtering, collaborative filtering and association rule mining	×	Book transaction database	×
4.	Book Recommendation System Using Opinion Mining Technique [4]	Assigning weights to features based on user opinion	×	Data from different search engines	×
5.	Book Recommendation System for Digital Library Based on User Profiles by Using Association Rule [5]	UCL Model	UL Model	65,521 transactions during January 2012 to February 2014	Precision
6.	Web-based Personalized Hybrid Book Recommendation System [6]	Combination of collaborative, content and demographic filtering	×	Scraped data	×
7.	Online Book Recommendation System [7]	Collaborative filtering method based on Pearson correlation coefficient	×	Data from www.readly.ru	Quality of recommendations, Speed of getting recommendations

8.	Web Recommended System Library Book Selection Using Item Based Collaborative Filtering Method [8]	Combination of item-based approach and collaborative filtering	×	Dataset of Telkom University Open Library	Mean Absolute Error (MAE) test
9.	The Design and Implementation of Books Recommendation System [9]	Combination of user-based collaborative filtering & item-based collaborative filtering	×	The database includes the tables of reader information, book information, borrowing record, reader similarity table, and book similarity and so on	×
10.	A Collaborative Filtering Based Library Book Recommendation System [10]	Collaborative filtering (CF) using Pearson correlation as similarity measure	Collaborative filtering (CF) using 1. Cosine Similarity as similarity measure 2. Euclidean distance as similarity measure	124,406 library records of Dhurakij Pundit University from Jan 1, 2014 to Dec 31	Accuracy

CONCLUSION

From this survey it can be concluded that problem of book recommendation can be solved by various techniques such as collaborative filtering, web service, hybrid techniques, Opinion mining & association rules. Also, it is observed that Pearson Correlation similarity measure of collaborative filtering technique works best in comparison with other similarity measures. Furthermore, performance of the system is dependent upon dataset used.

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