Online Book Recommendation System using Custom Recommender

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ABSTRACT

Recommendation systems can be considered as one of the most popular tools to raise the profit and retain users. In most of the fields Recommender systems are being used. The aim of the recommender system is that it suggests content for users based on their previous choices or what type of taste they are having. When there is a need for implementing an effective recommender system, it should always be diverse in content and it is not supposed to be biased towards the most popular content. In this perspective, the content-based filtering will provide well-suited results for the user. This research study attempts to propose a Recommender system for suggesting consecutive appropriate books for the user to read. The proposed recommender system is designed by using item-based collaborative filtering, content-based collaborative filtering (using Title, Author, Publisher, Category as features), Content-Based Collaborative Filtering (using Summary as a feature), Custom Recommender and at the end different recommenders are compared.

KEYWORDS – *Recommended Systems, Item-based Collaborative filtering, Content based filtering, book.*

INTRODUCTION

Searching relevant information is very tedious due to the presence of huge and voluminous data. Recommendation systems aim to solve these kinds of complications. Nowadays if we look for books on the internet then we can see that there is a large number of books available because of that it becomes very difficult to find well suited books for the user. Book recommendation systems aim to solve these kinds of problems. A book

a recommendation system can help a user to find an appropriate book for him. Recommendation system can be considered as one of the strongest systems for increasing profits by retaining more users in a very big competition. Many of the websites are using these recommendation systems. The purpose of a book recommendation system is always to

make predictions of buyer's interest and recommend books accordingly. A book recommendation system can take into account many parameters that could be based on the content and quality of the book by filtering the reviews of users. In this paper we proposed a recommendation system that will recommend books for users. We developed a system where a user can search for similar types of books or based on the previous reading, he will be provided the similar kind of books in which he can select his next book.

LITERATURE REVIEW

Shefali Gupta et al. (2019) [1] discussed the different types of techniques that ARE generated in the recommendation systems and about the two classes, one is Personalized and other is Non-personalized, in which recommendation systems can be categorized.

Tulasi Prasad Sariki et al. (2018) [2] proposed a content-based recommendation system in which Named Entities are used as criteria for providing the rank to books and accordingly gives the recommendation.

Nirav Raval et al. (2019) [3] discuss the collaborative filtering and collaborative filtering using various types of approaches like user-based recommendation, item-based recommendation and also collaborative filtering using matrix factorization.

Nursultan Kurmashov et al. (2015) [4] proposed a recommendation system by using collaborative filtering method which is based on Pearson coefficient, the overall architecture is presented with a detailed description and discussed the related surveys.

Anand Nautiyal et al. (2017) [5] presents an analysis of various algorithms used for recommendation like Collaborative based Filtering, Content based Filtering and Hybrid filtering by using Naïve bayes classifier and k-means clustering.

Badrul Sarwar et al. (2001) [6] analysed the various algorithms related to item-based recommendation and the discussed techniques for item-item similarities and also the techniques for getting recommendation.

Avi Rana et al. (2019) [7] proposed a recommendation that used the Collaborative Filtering with Jaccard Similarity for providing the better recommendation by reducing the problem of scalability and sparsity. JS index is used for a book to appear on the top for recommendation.

Shradhha Gupta (2020) [8] describes the basic working of the help provided by recommendation systems and the various merits of recommendation systems as well as their limitations.

Kaivan Shah (2019) [9] describes the working of item based collaborative approach and the brief of Collaborative Filtering, Content-based Filtering and Hybrid by using the 'goodbooks10k' as the dataset for book recommendation system.

Kumar et al. (2019) [10] describes the simulation of recommendation system by using the real dataset that is taken by the big marketing companies and Amazon Product Advertising by following the three steps: Analyse the data, Data processing and implementation of Bag of Words (BOW) and TF-IDF for providing the better recommendation.

RELATED WORK

Recommender systems are now being used in almost every sector because the data collected by user is used to provide them better experience and recommendations. There are different types of techniques available for recommendation [1]. Different types of techniques like collaborative based or content-based filtering have their analysis with different-different aspects. The big marketing companies and the product-based companies like Amazon in which the recommendation is done on the real dataset and where the three steps data analysis, processing of data and implementation of Bag of Words is used to provide the better recommendations. [3,5,6,10] Recommender Systems use three types of filtering: first one is Content based filtering, second is Collaborative filtering and third is Hybrid filtering. Hybrid filtering is the combination of both Collaborative and Content based filtering and further the

collaborative based filtering is categorized in model based and memory-based filtering
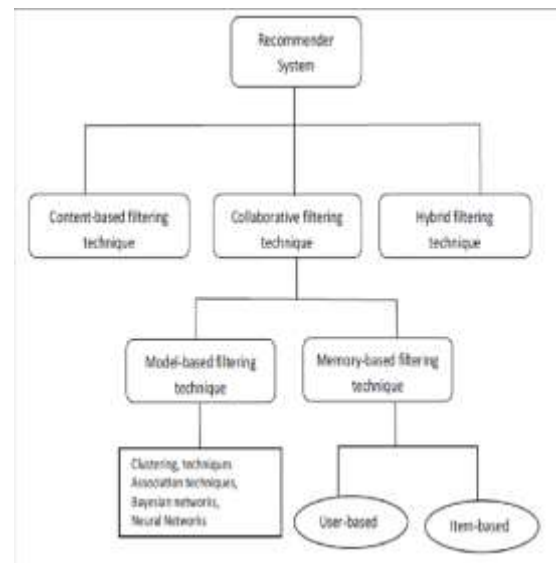

Fig. 1 Types of recommender system [9]

Recommender Systems use three types of filtering: first one is Content based filtering, second is Collaborative filtering and third is Hybrid filtering. Hybrid filtering is the combination of both Collaborative and Content based filtering. In our project we are going to implement a custom recommender, that custom recommender will give the results based on a combination of various techniques used for filtering so that users can get better recommendations.

Content Based Filtering

Content-based filtering involves recommendation for the books that seem to be relevant in content to those books that the user has already rated or given review. In the very first step of content-based filtering a profile of the user is made, that consists of the interest of the user and that taste is basically based on the books that have been already rated by that particular user. The recommender will analyse those type of books that were rated good with the books that are not been given review or checked for the similarities.[7]

Collaborative Based Filtering

Collaborative Filtering: In 1992, "Collaborative Filtering" was invented by Goldberg et al., they conclude that for humans the process of information filtering has become very effective. The meaning of word collaboration is that people collaborate to help each other to complete a task. [8]

Hybrid Recommender

Content based filtering and Collaborative based filtering Both of the approaches of recommendation systems suffer from some limitations, that is why the Hybrid recommenders are being introduced to overcome the limitations of both the techniques. Hybrid recommender is the recommender where we use the combination of Collaborative and Content based filtering.
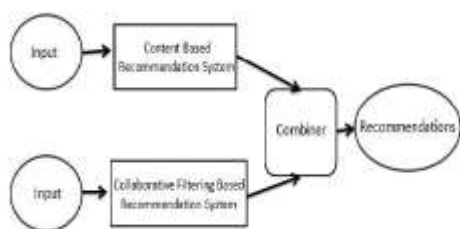

Fig 2. Hybrid Recommended system [8]

PROPOSED WORK

To build the custom recommender we will take the information from various internet sources. The proposed system will provide the recommendation to users by a combination of several algorithms that are being used for recommendation. Users will be able to have a combination of different types of recommendation as presented in Fig.3 and could find the better book among the top results. At the end of the implantation of all the recommenders, a comparison of all recommenders is done in order to conclude which recommender is appropriate for the user and can provide the better recommendations.

The dataset named **books** that we are going to use in our project have been downloaded from Kaggle. The data is having the columns user_id, location, age, isbn, rating, book_title, book_author, publisher, img_s, img_m, img_l, year_of_publication, Summary, Language, Category, city, state, country. The data contains large number of book titles along with their category and summary that makes it a good dataset for project work.

Custom Recommender

Custom recommenders will give recommendation as a combination of item-based filtering, content-based filtering using Title, Author, Publisher, Category as features, Content-Based filtering using Summary as a feature and top-rated book of the category except the already recommended.
The custom recommender will select the top results generated by item-based collaborative filtering and content- based filtering. As we can see in the fig. [3] that the first recommendation included in the

result generated by custom recommender would be the top results generated by item based collaborative filtering. Similarly, the second recommendation would be the top result generated by Content based filtering using title, author, publisher, category as feature and third and fourth recommendation would be top result generated by Content based filtering using summary as feature. The fifth recommendation of custom recommender would be the top-rated book of that particular category and it will not be similar to any already provided recommendation.
The working of custom recommender can be understood by below figure.
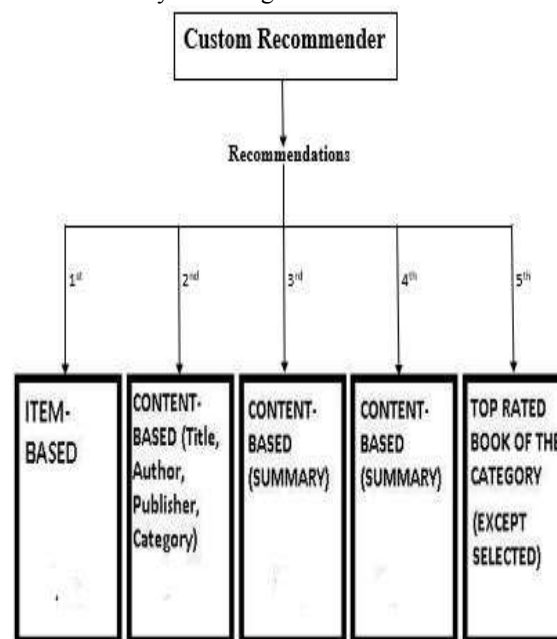

Fig 3. Custom recommender

Implementation of Custom Recommender

Fig. 4 [Results of custom recommender]

As we can see above in Fig. 4 that the custom recommender will generate the recommendations according to the combination of various types of filtering and aspect described in Fig. 3. The above all 5 results will be in the order such as shown in Fig. 3.

Comparison of all Recommenders

After the implementation of Content based collaborative filtering, Item-based Collaborative filtering and Custom Recommender, the comparison among them is done to show which recommender generates the variety of results for the user and recommend top rated books to users.

The result of comparison among all the recommenders along with custom recommender is done and shown below -

Item based recommender –

Fig. 5 Item based recommender

These are the top five results generated by recommender using item-based filtering.

Content based recommender -

Fig. 6 Content based recommender

These are the top five results generated by Content based recommender. In this recommender Title, Author, Publisher, Category are used as features.

Content based recommender-

Fig. 7 Content based recommender

These are the top five results generated by Content based recommender. In this recommender Summary is used as a feature.

Custom recommender-

Fig. 8 Content based recommender

These are the top five results generated by Custom recommender. In this recommender the combination of top result of Item based recommender, Content based recommender and top-rated book of that particular category is included. [fig. 3]

RESULT

From the above results it can be seen that the results produced by the custom recommender includes the books that are having top rating and popular in that particular category.

EQUIPMENT AND TOOLS USED

For coding purposes, we have chosen Python programming language which is among the top 5 programming languages that are being used. As per the requirement we have imported some of the libraries like PANDAS for data handling, NUMPY to deal with multi-dimensional arrays and the matrices, NLTK to deal with the data of human language, SKLEARN to solve machine learning problems, MATPLOTLIB to generate 2 Dimension graphs using python. JUPYTER NOTEBOOK is used for the execution of that coding part.

CONCLUSION & FUTURE SCOPE

This paper discussed the various techniques and implementation of recommendation as well as the combination of these techniques to build a custom recommender for book recommendation system. This custom recommender is useful to provide the user a variety of recommendations. In the comparison of all recommenders, custom recommenders generate the better results of books having top rating compared to other recommenders like Content-based filtering and Item-based Filtering. This comparison suggests that custom recommenders would be suitable for book recommendation for users to read the top-rated books.

Recommendation systems are being used very much for getting the suggestion of new items to the users and are playing a very crucial role in finding the similar type of new books or it can be movies and music also. To make a recommendation system effective it should be clear that the recommender should generate heterogeneous results and it is not supposed to be always biased towards only those items that are popular. There are some ML algorithms available that can be applied on these types of real time systems. Recommender system has been an active area of research for a decade or so and continues to be an interesting research domain.

REFERENCES

[1] Gupta, Shefali, and Meenu Dave, "A Recommendation System: Trends and Future", *IJEAT 8.6 Special Issue 3* (2019)

2] Sariki, Tulasi Prasad, and Bharadwaja G. Kumar. "A Book Recommendation System based on Named Entities", *Annals of Library and Information Studies* 65.1 (2018)

[3] Raval, Nirav, and Vijayshri Khedkar. "A Review Paper on Collaborative Filtering Based Movie Recommendation System", *International Journal of Scientific and Technology Research* 8.12 (2019)

[4] Kurmashov, Nursultan, Konstantin Latuta, and Abay Nussipbekov, "Online Book Recommendation System", *Proceedings of the 2015 12th International Conference on Electronics Computer and Computation, ICECCO 2015*

[5] Sahu, Satya Prakash, Anand Nautiyal, and Mahendra Prasad, " Machine Learning Algorithms for Recommender System - a Comparative Analysis", *International Journal of Computer Applications Technology and Research* 6.2 (2017)

[6] Sarwar, Badrul et al. "Item-based Collaborative Filtering Recommendation Algorithms", *Proceedings of the 10th International Conference on World Wide Web, WWW 2001*

[7] Rana, Avi, and K. Deeba. "Online Book Recommendation System Using Collaborative Filtering (with Jaccard Similarity)", *Journal of Physics: Conference Series*. Vol. 1362 Institute of Physics Publishing, 2019

[8] Shradhha Gupta, "A Literature Review on Recommender System", in *International Research Journal of Engineering and Technology (IRJET), Sep 2020*

[9] Bachelor, Kaivan Shah. "Book Recommendation System Using Item Based Collaborative Filtering", *International Research Journal of Engineering and Technology (IRJET),* May 2019

[10] Kumar, Illa Pavan, and Swathi Sambangi. "Content Based Apparel Recommendation System for Fashion Industry", *International Journal of Engineering and Advanced Technology* 8.6 (2019)

[11] Xiaowei, Shi. "An Intelligent Recommendation System Based On Fuzzy Logic", *Informatics in Control, Automation and Robotics I.* Kluwer Academic Publisher, 2006

[12] Guy, Ido et al. "Social Media Recommendation Based on People and Tags", *SIGIR 2010 Proceedings - 33rd Annual International ACM SIGIR Conference on Research and Development in Information Retrieval*. N.p., 2010

[13] Uko, E., B.O., and P.O. "An Improved Online Book Recommender System Using Collaborative Filtering Algorithm", *International Journal of Computer Application* 179.46 (2018)

[14] Chatti, Mohamaed Amine et al. "Tag-Based Collaborative Filtering Recommendation in Personal Learning Environments" *IEEE Transactions on Learning Technologies* 6.4 (2013)

[15] Rana, Chhavi, and Sanjay Kumar Jain, "Building a Book Recommender System Using Time Based Content Filtering", *WSEAS Transactions on Computers* 11.2 (2012)

[16] Feng, Junmei et al. "AN Improved Collaborative Filtering Method Based on Similarity", PLoS ONE 13.9 (2018)

[17] Patil, Abhay E et al. "Online Book Recommendation System Using Association Rule Mining and Collaborative Filtering", *International Journal of Computer Science and Mobile Computing* 8.4 (2019)