# Online book recommendation system

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# Online Book Recommendation System

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***Abstract* — Today the amount of information in the internet growth very rapidly and people need some instruments to find and access appropriate information. One of such tools is called recommendation system. Recommendation systems help to navigate quickly and receive necessary information. Generally they are used in Internet shops to increase the profit. This paper proposes a quick and intuitive book recommendation system that helps readers to find appropriate book to read next. The overall architecture is presented with it's detailed description. We used a collaborative filtering method based on Pearson correlation coefficient. Finally the experimental results based on the online survey are provided with some discussions.**

***Keywords—recommendation system, collaborative filtering, book.***

## I. INTRODUCTION

Nowadays the amount of information especially in Internet growth very rapidly. Finding necessary information becomes more difficult. Recommendation systems aim to solve this kind of problems. With the help of them one can quickly access relevant information without searching the web manually. As such many web sites today benefit from recommendation systems to promote and sell their products. There is a wide range of products like music, movies, articles and etc. that can be recommended to the customer based on their profiles in internet shops or even social networks, browsing history such as visited links, browsing activity like number and time of visits and other online behavior. Online shops are increasing their sales using such technologies.

In this paper we propose using recommendation systems for recommending books. We developed a system, which learns user preferences by asking to rate books and choosing favorite categories and then generate the list of books user most probably would like to read.

In Section 2 literature review on related researches is provided. Section 3 explains the detailed implementation of the proposed system. In Section 4 the evaluation procedure with results is presented. Finally in Section 5 we make some conclusions.

## II. RELATED WORK

Over the last 20 years there has been a considerable growth in the field of recommender systems. The research works like [1], [2] demonstrate a variety of state of the art methods and techniques applied today.

Recommendation systems use different kind of approaches to provide relevant recommendation. Traditionally collaborative filtering and content based filtering are used. The content based filtering approach learns the content of the item i.e. product to categorize it to appropriate user based on his preferences learned from his profile. The collaborative filtering, in contrast, doesn't rely on content and matches items with users based on the idea that those users who agreed in the past will also agree in the future. The data about their preferences can be collected upon ratings they give on the items. One of the successful implementations and use of collaborative filtering was done by Amazon company that recommends their wide range of products in a very efficient way. Also there is hybrid recommender system, which combine both of previously explained approaches.

There are many book recommendation systems for today [3], [4], [5], [6]. The authors of [7], [8] use social-media information to learn the preferences of users in order to make right recommendations. Chang et. al. [9] use such an information like interest fields, number of clicks to suggest appropriate book.

In this paper we propose 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.

## III. Proposed System

Existing recommendation services despite their powerfulness need a strong user profile information and history. User register to such systems, browse books, rate them, write their feedbacks, recommend to others, share, read appropriate information and etc. Based on such an information a system makes its recommendations. The examples of such services are whichbook.net, whatshouldireadnext.com, lazylibrary.com and etc. Instead our recommender system focuses on simplicity and speed. The user makes a registration and is asked to select 10 favorite books from at least 3 categories (genres). Based on this information the system makes recommendations. Further the user can continue to rate the books, buy them and add them to read list and thus allow to improve the quality of recommendations. The system overview is demonstrated in Fig. 1. A user, using an intuitive search and filtering interface updates a database by rating the books and then gets appropriate recommendations. The recommendations in turn are calculated based on collaborative filtering method.

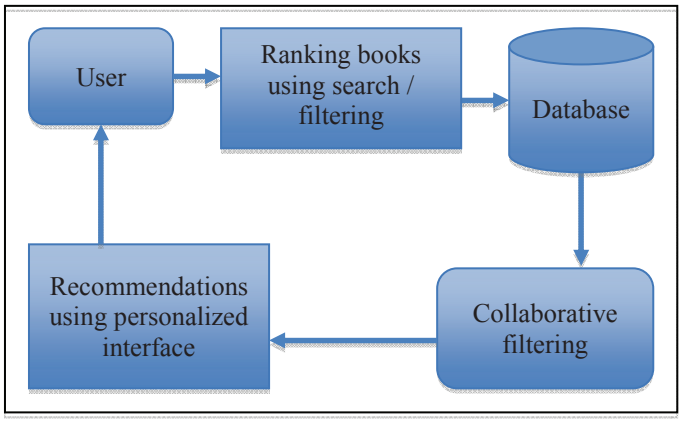


Fig. 1. System overview

### A. Collecting Data

In recommendation system the amount of data plays an important role. In order to provide accurate recommendations one have to provide enough data. For that purpose we decided to collect data from existing resources. Our service is focused on Russian-speaking users so we decided to collect data from www.readly.ru - a web service providing tens of thousands of books from a variety of different genres. To collect the data we used Scrappy technology. Scrappy is a special framework for crawling web sites, which are not provided with API and extracting data. The principle of this library is simple. Firstly one needs to define the data he wants to scrape, write a spider to parse the data and then run the spider. We collected data and stored it into MySQL database. The amount of books is about 25.000 popular books.

### B. Learning User Preferences

There are two types of users in the system: guest and registered users. Guest can search for appropriate book, read descriptions and see the ratings. Whereas registered users can rate items and see the recommendations of the system.

In the very beginning, after making registration a user asked to choose three or more favorite genres (see Fig. 2) and then rate minimum 10 books to learn his preferences. In order to quickly find beloved book an intuitive search box with a wide range of search and category listing is provided (see Fig. 3).

Fig. 2. Choosing genres

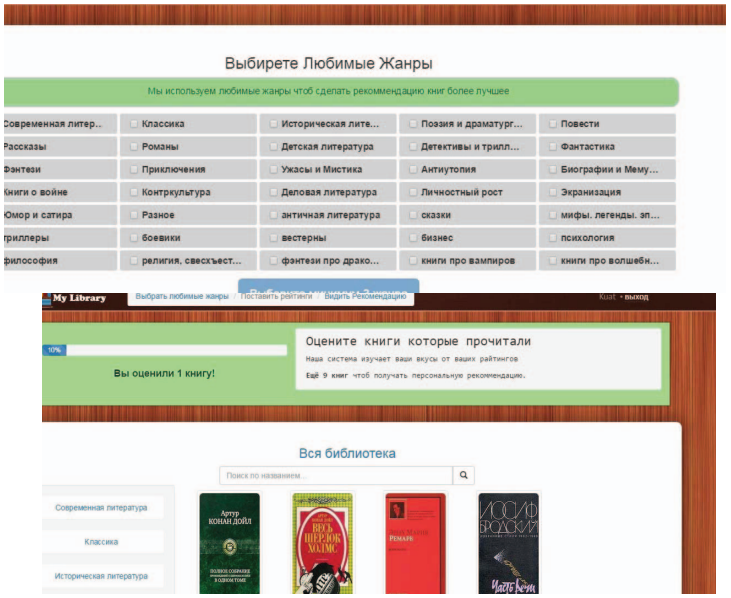


Fig. 3. Searching and rating a book

### C. Providing Recommendations

After learning user preferences the system provides recommendations (see Fig. 4). Recommendations can be seen as a simple list or divided by genres.

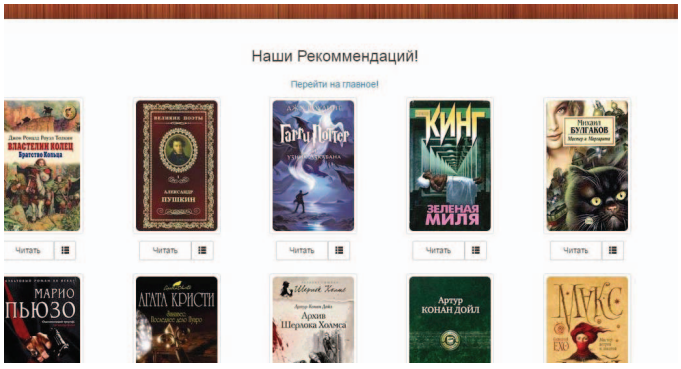


Fig. 4. Recommended books

In our work we decided to use collaborative filtering for generating the recommendations. Collaborative filtering is an approach to make recommendations on different items for users by collecting a bunch of information about their preferences [10]. As it was mentioned before the idea of a collaborative filtering is that if two users have same preferences on a particular item (see Fig. 5 user1 and 2) then most likely that they will have same opinions on other items rather than with some other random user. A collaborative filtering has different types of realizations. One of them are build on a neighborhood-based algorithms that calculate

similarity between two items. In our project we calculate similarity by using Pearson correlation function:

$$r = \frac{\sum XY - \frac{\sum X \times \sum Y}{N}}{\sqrt{(\sum X^2 - \frac{(\sum X)^2}{N}) - (\sum Y^2 - \frac{(\sum Y)^2}{N})}} \quad (1)$$

Similarity $r$ between two users $X$ and $Y$ can have values between 1 and -1 where 1 means two users are absolutely similar and -1 vice versa.

ed between 0 and 5 or can be unrated with char 'X'


Fig. 5. User preferences table

We used such technologies like Ajax, JRating, Bootstrap in order to make our system simpler, user friendly and intuitive to use. After learning recommendations a user is given a list of links where he can download and buy theses books.

## IV. Experiment Results

As Shani and Gunawardana say [11], experiments on recommendation systems are divided into three categories: a) offline experiments: when user behavior is simulated i.e. the process of system making predictions and recommendations and the user corrects them or uses these recommendation is simulated, b) user studies: analyze the quantitative and qualitative measurements and observe the behavior of a group of subjects that will interact with the system, c) online evaluation: the system is used by real users on real tasks and then analyzed. In our research we decided to use an online survey because of to the best of our knowledge there is no available database suitable for our task and because online evaluation can not be applied yet. Therefore we decided to analyze the performance of our system by creating an online survey.

We selected a group of independent readers and asked them to give score (0-10) on such parameters of the system like quality of recommendations and convenience and ease of use of the system. The higher score indicates the relevance of recommendations. Also additional field for user notes was added to the questionnaire.

Experiment results are demonstrated in Fig. 6. They show the average of user opinions. It can be seen that users liked the easy of use of the system i.e. the speed of getting recommendations (89%) while the quality of recommendations was estimated at 77%.

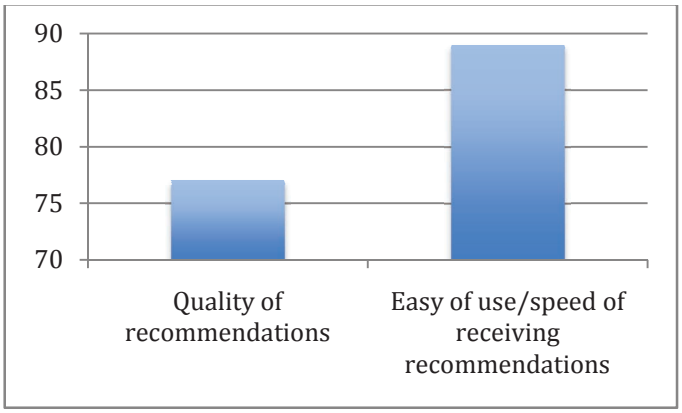


Fig. 6. Experiment results

Although the promising results of online survey users indicated several problems related to system. One of them was that sometimes the same book appears in different categories which makes recommendations less useful. This is because some of the genres are very closely related to each other and therefore the items of that genres can appear in both of genres.

## V. Conclusion

In this paper we present a recommendation system that is based on collaborative filtering method. The main goal was the speed of recommendations i.e. to create such a system, which can give qualitative recommendations to their users without need to be registered for a long time and have big profile information, browsing history and etc. Experiment results show that the proposed method provides relevant recommendations.

The proposed work can be applied for other domains to suggest such items like movies, music and other products.

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