E-library

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Abstract: E-Library is a project which aims in developing a computerized system to maintain all the daily work of library .This project has many features which are generally not available in normal library management systems like facility of user login. It also has a facility of admin login through which the admin can monitor the whole system. It has also a facility where member after logging in their accounts can see list of books issued and its issue date and return date. It also calculate penalty. In this project, we aim to design a recommender system for books. Keeping customers is very important in e-commerce websites; this relationship is useful for both customers and websites. For maintaining this relationship this project uses recommendation system. E-library books recommender system is established by combining two different algorithms. Our first algorithm Collaborative Filtering is used to find similarities between two items according to their ratings. Then second algorithm called as AprioriAll is used for pattern matching and personalized recommendation. Overall proposed system is being developed to maintain the library in the best way possible and also reduce the human efforts.

Keywords- E-library, recommendation, Collaborative Filtering, AprioriAll, pattern matching.

I. INTRODUCTION

E-Library is a source that rebuilds the knowledge and supports of conventional library in digital form. It is a tool to help any libraries which are still using the old way to manage their library. In existing system searching of books is difficult, fast report generation is not possible, information about issue/return of the books are not properly maintained. But by using the E-Library, user can overcome all the problems mentioned above. This system can manage all the happenings of the library. Book transactions such as book searching, availability of the book, details and appearance of the book, subscription plan, personal book borrowing history and etc. can be very easily handled by this system. This system is suitable for small to big libraries including medical and legal libraries, colleges, schools, universities, corporate houses and other academic resource centers.

Our project is a Web application which makes use of open source web based content management system e.g. Word press. [3] This application will be present on Desktop or smartphone. E-library has two modules: Member and Admin Module. First of all, Members are allowed to search material by title, name/author, subject, publication, series, ISBN/ISSN and etc[1] ,to find recently arrived material and subscribe different plans for issuing book. Admin can receive book from member, apply charges for books which are received after due date. Lastly, the admin can help administrator to register/reassign shelf and category, change book status, configuration to register users, and database backup/restore. In proposed system book recommendation is done by using different algorithms such as collaborative filtering, AprioriAll. Overall this system can be very helpful and it can make things easier.

II. LITERATURE REVIEW

Up to now, several studies have been reported that have focused on E-Library. These studies have applied different approaches to the given problem and achieved high classification accuracies of 77% or higher.

In [1] Author developed a Library management System. This system is builds using HTML and JavaScript. It provides better and efficient service to members. Reduce the workload of employee.

In [2] this paper describes the theoretical design of a Library Recommendation System, employing k-means clustering Data Mining algorithm, with subject headings of borrowed items as the basis for generating pertinent recommendations. This paper reports analysis of all components of the Recommendation System, namely, Data warehousing and Data Mining (using k-means clustering technique). It can be surmised from the discussions that the research questions proposed can be effectively resolved. Hence, extraction of user profiles into a DWH and the application k-means clustering to make appropriate recommendations are theoretically feasible using the proposed design.

In [3] this will make use of Drupal content management system. This provide appropriate combination to build web or web application around the product, sell access to premium contents, and offers subscription facility or payment gateways for file downloads. But there is a future scope for this project, instead the functionalities of all related or depended modules can be integrated in one and can be specially developed for developing similar online store or library services. Using that the Drupal system can be migrated to smart-phone or tab devices. Nowadays smart-phone platform is picking up the market. So it will add an advantage to the system if it is also configurable for smart devices.

In [4] they defined users' interests based on their clicks on different news categories. They create user profiles and use a Bayesian framework in order to predict user interests. Their recommender system is considered a content-based recommender system and is combined with the previous Google news recommender system, which was designed based on collaborative filtering.

III. PROJECT DESIGN

In E-Library system there is login and registration facility for members. After that Members are allowed to search material by title, name/author, subject, publication, series, ISBN/ISSN and etc. , to find recently arrived material and subscribe different plans for issuing book. . Admin can receive book from member, apply charges for books which are received after due date. Admin can also add the subscription plan and book details. In this system inventory is manage automatically.

In proposed system book recommendation is done by using different algorithms such as collaborative filtering, AprioriAll. In this system we use mainly three approaches for recommendation.

First, the systems combined the users rating of the learned content and their personal information to carry out collaborative recommendation, such as literature. After rating of Web pages made by students, the system gives recommendation to the students who share nearly the same interests based on their similar age, major and knowledge structure.

Second the system offers recommendation according to content based on information filtering, such as Personal Web Watcher, web personalizes, Group Lens, Site seer. They offer recommendation using similarities between the sources and user's interest, as well as similarities between user's personal information.

Third, the systems gave recommendation according to the user's sequences of accessing website. For example, WUM (Web Utilization Miner)[4]mined the sequential pattern of Web log, which provided a integrated environment including log preparation, pattern inquiry and visualization interface.

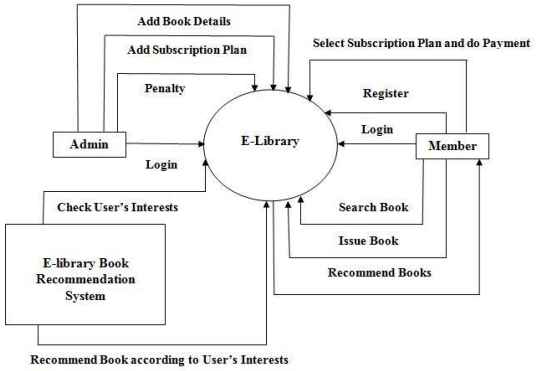

Figure 1: E-library System

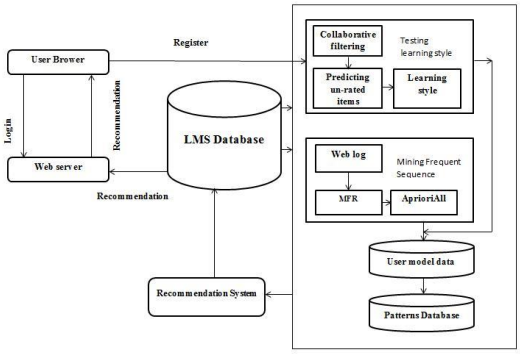

Figure 2: E-Library Book Recommendation system

IV. ALGORITHM

Collaborative Filtering:

1) Calculating the similarities between two items: Supposing all of the users U have simultaneously made the appraisal to Item-j1 and Item-j2, the similarities between Item-j1 and Item-j2 can be calculated by many kinds of arithmetic [11]. This paper uses Pearson-r to calculate, and its formula is shown as follows:

$$sim(j1, j2) = \frac{\sum_{u \in U} (R_{u,j1} - \overline{R_{j1}})(R_{u,j2} - \overline{R_{j2}})}{\sqrt{\sum_{u \in U} (R_{u,j1} - \overline{R_{j1}})^2} \cdot \sqrt{\sum_{u \in U} (R_{u,j2} - \overline{R_{j2}})^2}}$$

Where Ru, j1 denotes the rating of user U on itemj1, R j1 is the average rating of the j1-th item.

2) Calculating the un-rated item's score: According to the first step, the top-N most similar items of un-rated item are obtained. Assuming that user has not rated item-i, the following formula can be used to calculate the unknown score.

$$P_{u,i} = \frac{\sum all-similar-items, N\,(Sim_{i,N} * R_{u,N})}{\sum all-similar-items, N\,(|Sim_{i,N}|)}$$

Finally, the recommendation system can get the summation of the students' rates on the scale, as well as the type of the students' learning style.

Pattern Discovery and Personalized Recommendations:

1) Searching for frequent sequences

After extracting user's access sequences from Weblog file of the server, System pre-processes these sequences to MFR path.[4]

2) Algorithm of AprioriAll:

The first step: Checking for the frequent sequences. For every candidate sequence c with length of i, the algorithm carries out the traversal of the transaction database to test whether its support value is greater than the threshold value, min_sup. All of the frequent sequences, which have lager support values than min sup, constitute the frequent sequence set Li.

For the purpose of finding longer frequent sequences, the algorithm uses these sequences in collection Li to produce new longer sequences with length of i+1, as the candidates of longer frequent sequences. How to produce new longer candidate sequences is described in the second step.

The second step: is connecting step, carrying out Lk−1 and Lk−1 connection operation, such as connecting<1,2,3> and <1,2,4> to form <1,2,3,4> and <1, 2, 4, 3>two sequences.

The third step: is pruning step, carrying out the redundancy trim. After two sequences connected together, if any of its contiguous (k-1) subsequence is out of L k−1 , this sequence should be deleted.

3) Personalized recommendation

Recommendation is done using fixed size of sliding window to cover on present user's access sequence for predicting next operating. Meanwhile, user's access sequence is continually changing within the sliding window. Assuming that the size of the sliding windows is size 4, user's present access sequence within the sliding window may be <A, B, C, D>. The next new ones will turn into the sequence of <B, C, D, E>. How can the recommendation system predict E from <A, B,C, D>? It depends on frequent sequence sets of different learning styles.

For example, if sequences of <A, B, C,D, X> and <A, B, C, D, Y> are two frequent sequences whose learning style is the same with the user, then X and Y may be recommended to the user.

V. IMPLEMENTATION DETAILS

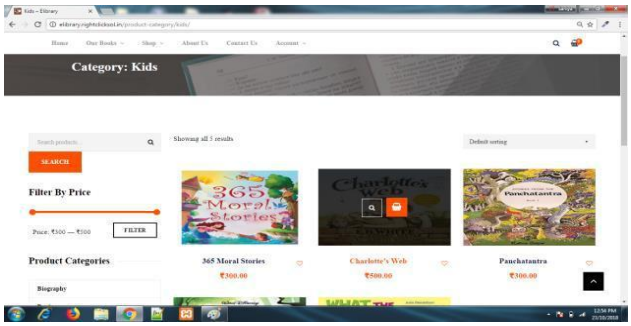

Figure 3: Carousel

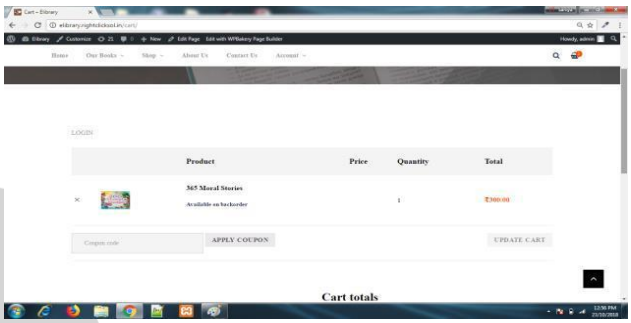

Figure 4: Cart

VI. CONCLUSION

E-library allows the user to store the book details and the customer details. This website allows storing the details of all the data related to library. E-library will save customer's travelling time. This will also help user to get knowledge about new additions of books in library related to their previous interests.

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