ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 5, May 2018

Implementing Collaborative Filtering Approach in Online Event Recommendation System

Rohan Katariya[1], V Krishna Mohan[2], Shubham Suryawanshi[3], Ruturaj Dhaneshwar[4], Geetha Chillarge[5]

Student, Department of Computer Engineering, MMCOE, Pune, Maharashtra, India[1]

Student, Department of Computer Engineering, MMCOE, Pune, Maharashtra, India[2]

Student, Department of Computer Engineering, MMCOE, Pune, Maharashtra, India[3]

Student, Department of Computer Engineering, MMCOE, Pune, Maharashtra, India[4]

Assistant Professor, Department of Computer Engineering, MMCOE, Pune, Maharashtra, India[5]

ABSTRACT: In the recent period, recommendation system has gained a lots of popularity in the field of e-commerce and many more computer applications. The availability of huge amount of data and services provided by multiple organizations has led to the large scale usage of recommendation system strategy for meeting customer's never ending needs. This also enables the organizations to increase their overall productivity and make profit. There are many online portals available to provide event organization but conventionally do not use recommendation strategy. The present system aims to use recommendation system strategy to offer recommendations in terms of function halls, catering service vendor, decoration services, etc. to its users, since event organization can be considered to be one of the time consuming task. The proposed system uses collaborative type of filtering technique for generating recommendations. This increases accuracy in generating recommendations and meet user's demand more precisely.

KEYWORDS*:*Machine learning, recommendation system, collaborative filtering, adjusted-cosine similarity, information filtering.

I. INTRODUCTION

Recommendation system [3] is a system which helps in predicting the user ratings and user preferences, which further helps other users to buy items accordingly. It is a type of information filtering system. There are many domains like music, movies, news, books, social websites, daily items where recommendation system is being used extensively. In the current context, event recommendation system deals with recommending function halls, catering service vendors, decoration service vendors, etc. to its users. This system considers whole user community for generating recommendation with respect to target user. The previous usage experiences and rating are used to generate recommendations. Basically there are two types of methods used in developing recommendation system:

Content-based filtering: The content-based filtering systems [8][1] tries to generate the recommendations on the basis of ratings of target user to a particular item used. Content based filtering generally focuses on personalized recommendation. This type of technique is applicable only under the condition when a particular item has been used and rated by the respective user. Previous experiences of a user plays a major role in this type of technique.

Collaborative filtering: Collaborative filtering [8] is the process of filtering the data and generating recommendation by involving the whole community involved in the system. This type of technique implements to find similar other users experiences from the community. There are two types of approaches in collaborative filtering:

ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 5, May 2018

1) User-based collaborative filtering: This approach tends to find similarity between users using similarity measures. Using the past usages and given ratings to the items, similar users are calculated and the recommendations are generated depending on this sorted users. This system may sometime perform inefficiently when amount of items in more.

2) Item-based collaborative filtering: In this type of algorithm, similarity between different items are calculated by using similarity measures and then these similarity measures are used to predict ratings. Item-based models use rating distributions per item, instead of per user. This leads to more stable rating distributions in the system. The following figure.1 and figure.2 gives the illustration of user-based and item-based collaborative filtering respectively.

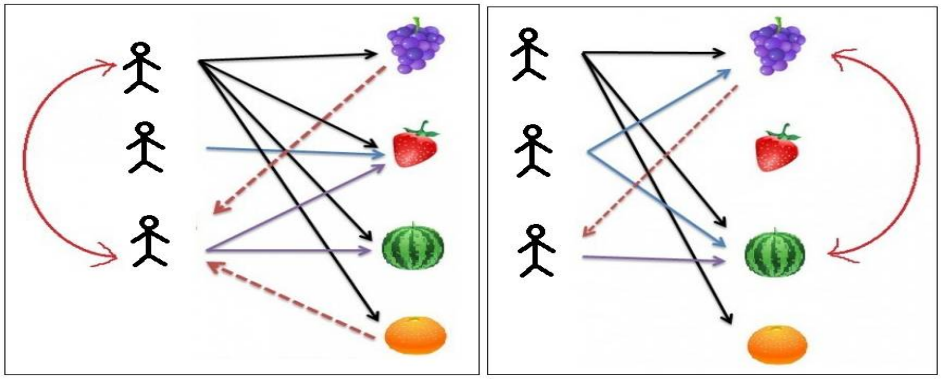

Fig.1. User-based collaborative filtering Fig.2. Item-based collaborative filtering

Recommendation system provides a way to evaluate among the services offered by a particular provider. The proposed system uses item-based collaborative filtering technique. System uses adjusted-cosine similarity as a similarity measure to find the similarities between the items using the ratings given to the items by users. Further weighted sum algorithm is used to find the predicted ratings for the items to those user has not given any ratings.

This paper gives an overview to the whole development of event recommendation system. The organization of the paper is as follows: In section 2, related work is discussed. In section 3, the proposed methodology is described which elaborates the algorithms briefly. Section 4, depicts the system architecture of the system. Section 5 describes experimental results and section 6 consist of conclusion and future work with respect to the current system.

II. RELATED WORK

In the present scenarios, the huge amount of information is available online due to implementation and understanding of the possibilities of internet. Recommendation system [9] is a system to understand user needs. It saves user's time of a searching appropriate and interesting contents, and it offers the favourite content of another user with similar profile or similar content of user's favourite one. Due to this reason, it makes World Wide Web as an important research area. In paper [4], author has discussed about optimizing the collaborative filtering technique by selecting an effective user neighbourhood for recommendation system. Paper [8], has introduced the concepts of recommendation system and described the types of technologies related to recommendation system briefly. [7], describes the techniques and applications involved in Collaborative filtering method and mainly focused on enhancing the Collaborative filtering technique and in addition to this, [2], presented the typicality based Collaborative filtering technique for more accurate recommendation. Paper [5], proposed personalized hybrid recommendation system by eliminating few drawbacks in traditional collaborative filtering technique. In [3], the author has described the types of Collaborative filtering techniques primarily used in recommendation system. The author also proposed the methodology to find the similarity between the items viz. adjusted cosine similarity algorithm.

ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 5, May 2018

As per the research, analysis and previous implementations on recommendation, Collaborative filtering technique can be considered as a reliable option among the available technologies for recommendation system. The proposed event recommendation system aims to provide users with best recommendation related to event organization.

III. SYSTEM ARCHITECTURE

The following figure.3 depicts the system architecture of the proposed system. Majorly the system follows the client-server architecture. Server side of the system includes the recommendation engine (Adjusted cosine similarity + weighted sum), Database which consist of user information received during user registration to the system and the datasets of function halls, catering services, decoration services. Client side may include computer machine, mobile device, etc. where the user interface is provided.

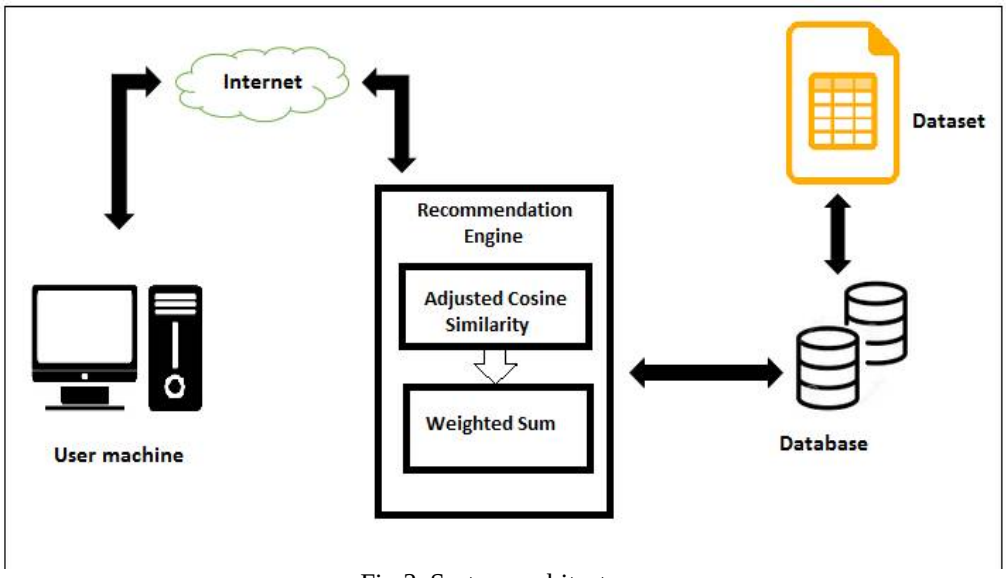

Fig.3. System architecture

Once the user logs into the system followed by the registration procedure, user can needs to give few preferences in order to get recommendations. Parameter like event type, event location, and approximate budget needs to be provided by the user. Upon receiving the required data from user, the system implements according to the algorithm and offer the recommended options to the user in the form of function halls, catering services vendors, decoration service vendors.

IV. PROPOSED ALGORITHM

In the current system, under item based collaborative filtering [10], the proposed system implements adjusted-cosine similarity to find the similarity among the available items associated with all users. Further by applying weighted sum technique, the ratings for the items to which users had not rated will be predicted. The complete implemented methodology has been described as follows:

A. Datasets:
The system uses the explicitly created datasets required for the algorithm. Separate datasets are created for function halls data, catering service, decoration service respectively.

ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 5, May 2018

B. Adjusted-Cosine Similarity:
There are multiple options related to choosing the similarity measure. Pearson correlation, cosine vector similarity, adjusted-cosine similarity are some of the well know similarity measures used to compute the similarity. Computing similarity by using basic cosine measure in item-based case has one important drawback-the difference in rating scale between different users are not taken into account i.e there can be a wide difference in the ratings given by different users to the same item. The adjusted cosine similarity eliminates this drawback by subtracting the corresponding user average from each co-rated pair. The formulation for adjusted-cosine similarity is described below:

$$sim(i,j) = \frac{\sum_{u \in U}(R_{u,i} - \overline{R_u})(R_{u,j} - \overline{R_u})}{\sqrt{\sum_{u \in U}(R_{u,i} - \overline{R_u})^2} \sqrt{\sum_{u \in U}(R_{u,j} - \overline{R_u})^2}} \quad (1)$$

Where, $R_{u,i}$ is rating of user *u* for item *i*,
$\overline{R_u}$ is average rating of user *u* for all correlated items,
$R_{u,j}$ is rating of user *u* for item *j*.

The adjusted-cosine similarity works in the following manner:

Step 1. First, the algorithm accepts the product id, user id, ratings to the products from the dataset table and transform it to user-item matrix.

Step 2. In this step, the item-to-item matrix is computed. Here the actual adjusted-cosine similarity is implemented. The idea is to calculate how similar an item is to another item.

Step 3. This step is concerned about finding the predicted rating for the items that user had not rated. This is also called as prediction computation. Weighted sum technique is used in this case. This step is briefly described in the following section.

C. Prediction Computation:
Prediction computation method is concerned about predicting the ratings for an items to which the user had not rated. The proposed system uses weighted sum method for predicting the ratings. This method computes the prediction on an item *i* for a user *u* by computing the sum of the ratings given by the user on the items similar to *i*. The formula for the weighted sum is described below:

$$Pu,i = \frac{\sum allsimilaritems,N(Si,N * Ru,N)}{\sum allsimilaritems,N(|Si,N|)} \quad (2)$$

Where, *Pu,i*denotes Predicted rating for item i by users *u*,
Si,N is the similarity of the item *i*to *N* items,
*Ru,N*is the rating of the item *i*items.

Once the ratings are predicted, depending upon the ratings preferences the respected items will be sorted and will be recommended to the user.

V. EXPERIMENTAL RESULTS

Through the user interface provided at the client side, the user needs to log into the system. After successfully logging into the system, the system asks for the few essential parameters like desired event type to be organised, event location, budget, etc. User needs to provide information as per his/her convenience. Once the system receives the required data from user, it prefers that particular user as a target user and with respect to the target user, it collaboratively considers all the other users past records (ratings to the items) and finds the most similar items with respect to target user. Along with it, it computes the predicted ratings to the items to which target user had not rated and then according to a specific ratings range, system sorts the items and offers it to the target user as a recommended

ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 5, May 2018

items. Following are the snapshots of the proposed system. Figure.4, presents the homepage of the system's website presenting the categories viz. function halls, catering service vendors, decoration service vendors, etc. for generation of recommendations. Figure.5, represents the recommendation items generated only for function halls.

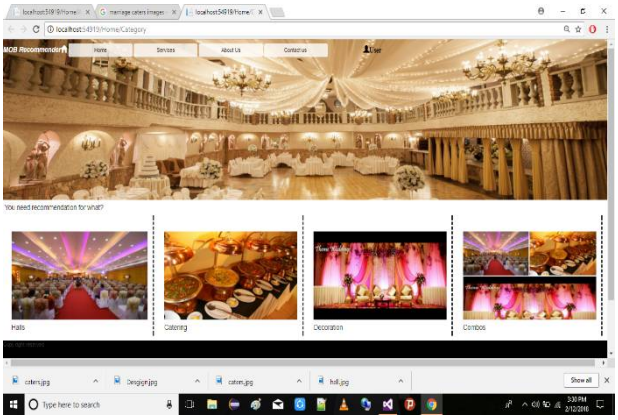

Fig.4. Homepage for the website presenting categories for generating recommendations.

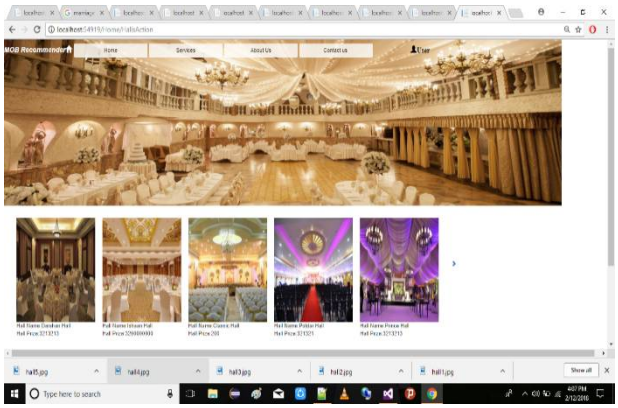

Fig.5. Recommended items for function halls.

VI. CONCLUSION AND FUTURE WORK

The proposed system recommends its user with appropriate data items viz. Function halls, Catering service vendors, Decoration service vendors, etc. The system overcomes the major overheads in conducting any events such as Marriages or birthdays. Major role is to recommend the most rated services related to the events. This is achieved by technique called collaborative filtering one of the most used recommendation algorithm. Under collaborative filtering Item-based collaborative filtering method is used in which adjusted cosine similarity followed by weighted sum method is used to compute the similarity between the items and predict the ratings for unrated itemsand produce the respective recommendations. Accordingly, most accurate recommendation is suggested to the user, based on the interest in type of the event. The future work with respect to this project can be making recommendation system more efficient by resolving common issues like cold start. Use of knowledge based collaborative filtering can also be carried out.

REFERENCES

1. Yuto Ishida, Takahiro Uchiya, Ichi Takumi, "Recommendation System that Presents the Recommendation Sentence in Alignment with the Contents" 19th International Conference on Network-Based Information Systems in 2016.
2. Sharandeep Kaur, Dr. Rama Krishna Challa, Dr. Naveen Kumar, Mrs. Shano Solanki, Shalini Sharma, Khushleen Kaur, "Recommendation Generation Using Typicality Based Collaborative Filtering" 2017 7th International Conference on Cloud Computing, Data Science & Engineering – Confluence.
3. SuhasiniParvatikar, Dr. Bharti Joshi, "Online Book Recommendation System by using Collaborative filtering and Association Mining" IEEE International Conference on Computational Intelligence and Computing Research in 2015.
4. SundusAyyaz and Usman Qamar, "Improving Collaborative Filtering by Selecting an Effective User Neighborhood for Recommender Systems" 2017 IEEE International Conference on Industrial Technology (ICIT).
5. Yannan Song, Shi Liu, Wei Ji, "Research on Personalized Hybrid Recommendation System", 2017 International Conference on Computer, Information and Telecommunication Systems (CITS).
6. SajalHalder, A. M. Jehad Sarkar, Young-Koo Lee, "Movie Recommendation System Based on Movie Swarm", 2012 Second International Conference on Cloud and Green Computing.
7. Najdt Mustafa, Ashraf Osman Ibrahim, Ali Ahmed, Afnizanfaizal Abdullah, "Collaborative Filtering: Techniques and Applications", International Conference on Communication, Control, Computing and Electronics Engineering (ICCCCEE), Khartoum, Sudan in 2017.
8. AnandKishor Pandey, Dharmveer Singh Rajpoot, "Resolving Cold Start problem in recommendation system using demographic approach", 2016 International Conference on Signal Processing and Communication (ICSC).
9. Marian Spilka, Alexandra Posoldova, GregorRozinaj, PavolPodhradsky, " Importance of Recommendation System in modern forms of learning" 2016 – 23rd International Conference on systems, signals and Image Processing, Bratislava, Slovakia.

ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 5, May 2018

10. Siddharth J. Mehta, JinkalJavia, " Threshold based KNN for fast and more accurate recommendation", 2015 IEEE 2nd International Conference on Recent Trends in Information Systems (ReTIS).
11. Jyoti Gupta, Jayant Gadge "Performance Analysis of Recommendation System Based On Collaborative Filtering and Demographics", 2015 International Conference on Communication, Information & Computing Technology (ICCICT), Jan. 16-17, Mumbai, India.
12. Elena Shakirova, "Collaborative Filtering for Music Recommender System", 2017 IEEE Conference of Russian Young Researchers in Electrical and Electonics Engineering (EIConRus).