



Framework for Opinion Based Product Recommender System

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ABSTRACT

The growth of the internet has boosted the E-Commerce (online shopping). Nowadays online shopping is very much popular with the increased number of individuals connected to the internet, and day by day the interest in online shopping is also increasing. The increasing number of products over the E-Commerce has created the problems for the users to purchase the exact product at the exact time because of information overload. A recommender system recommends suitable item to the users from among the huge amount of data that fulfill their taste, interest and behavior. The paper presents an overview of the Recommender system, its techniques with their shortcomings and further we proposed our framework for product recommendation using opinions.

Keywords: E-Commerce; Ratings; Reviews; Online Shopping; Recommendation Technique.

I. INTRODUCTION

Since the advent of the Internet, huge volume of information has gone online. The amount of information available on the internet has become enormous and is still growing. It has been seen that, thousands of hours of YouTube videos are uploaded to the YouTube site every hour, in addition to this, millions of products information is uploaded to e-commerce sites every week, thousands of books are published every month and millions of blogs are published every week. While the internet grows rapidly, the information it contains is also updated constantly.

With such advancement we can imagine that the difficulty of finding relevant information from the internet is rapidly expanding, thus a system is required that supports us for finding information as per need [3]. Two techniques Information search and Recommendation have been developed to help

online users to handle information overload problem. Search engines are good tools and techniques to assist in looking for information, but returns hundreds of results on every query while few of them are relevant as per expected search, and as a result users have hard time finding the right information at the right time. Recommender system can be defined as information filtering tools or a technique that recommends suitable items to the users, predicting a user's interest, behavior and taste.

The ability of computers to provide recommendation was recognized early in the history of computing. Grundy System [1] was the first recommender system (computer based librarian) it was a primitive, grouping users into stereotypes based on a short interview and uses them to recommend relevant books to each other. Later on a Trapstry [2] a collaborative filtering approach was developed at the Xero Palo Alto research center, Trapstry was designed to recommend documents from news group to help users with large volume of

documents. Over a period of time a number of recommender systems for various domains such as the Ringo [4] for music, Bell Core video [5] for movies and Jester [6] for jokes, etc. have been developed.

II. RECOMMENDER SYSTEMS APPROACHES OR TECHNIQUES

A. Collaborative Filtering System

Make recommendations to the active user using information about a set of similar users. [9]

B. Content-based Filtering System

Use data about the items and information regarding the active user. [9]

C. Demographic Filtering Systems

Use demographic information such as age, gender, education, etc. of people for identifying types of users. [9]

D. Hybrid Recommender Systems

Hybrid approaches, attempting to keep the advantages of the combination of methods, and to reduce or take out disadvantages and problems. [19]

Table 1: Applications using recommender system approaches.

S.No.	Applications	Recommender System Approach
1.	Facebook	Collaborative filtering Content based
2.	Twitter	Collaborative filtering
3.	LinkedIn	Collaborative filtering
4.	Netflix	Hybrid recommender system
5.	MovieLens	Collaborative filtering
6.	Amazon	Item to item collaborative filtering Content-based recommendation
7.	eBay	Collaborative filtering Demographic recommendation
8.	Jester	Collaborative filtering

III. ISSUES AND CHALLENGES FOR RECOMMENDER SYSTEM

A. Cold Start Problem

A new Item or new user enters the system. [7].

B. New User Problem

User has to rate some of the items before recommender system algorithms can understand user's interest and recommends an item to the user

C. New Item Problem

Continuously new items are added to Ecommerce. Until the new item is rated or purchased by any users, the recommender system algorithms would not be able to recommend it to any user.

D. Synonymy

When similar items have a different name then recommender systems algorithm treats these items differently [8].

E. Privacy

Gathering of user or items data leads to privacy issue. Naturally the question of confidentiality of the given information arises [9].

F. Scalability

When the number of existing items and users grows tremendously the traditional recommender system algorithms may suffer serious scalability problem [9].

IV. RELATED WORK

In this section we introduce some of the major existing works related to recommender system main approaches viz collaborative filtering, content based and hybrid used for recommendations is described.

Collaborative filtering recommender system [38] predicts an item for the active users by aggregating the experience of other users who are similar to the existing users, with respect to the taste interest and behavior or other aspects. This technique computes the similarity between users or items using the Pearson, Cosine, and Mean Square Difference

similarity measures. Grouplens [10] works based on user ratings and can be used to generate recommendations about music, news and movies. Movielens [11] is a system for recommendation of movies based on similar techniques of predicting weight of items. Ringo [4] based on nearest neighbor technique recommends music based on similarities between the user's interest and those of other users. Jester [6] a joke recommender system recommends jokes using a collaborative filtering algorithm called Eigentaste. It uses recursive rectangular clustering method for the offline phase and nearest neighbor algorithm for the online phase. The main challenges that the collaborative filtering deals with is cold start problem, when new user or new item enters into the system. To solve this issue different methods have been proposed including the as-to-rate method [12] which asks for explicit ratings to deal with cold start user problem. It extracts initial information about new user with quick and short interview during the registration time. Another major limitation of the collaborative filtering approach is data sparsity [13]. Several techniques have been proposed to cope with the data sparsity. Dimensionality reduction approach such as Singular Value Decomposition (SVD) used by [14] removes unrepresentative or insignificant items or users to reduce the user-item matrix directly.

A content-based recommender system generates recommendations based on the content of products rather than user's ratings on these products. One of the drawbacks of the content based recommendation approach is the cold start problem [1]. Reducing the cold start problem through opinions in content based recommender system as proposed by [15] exploits blog textual data in order to supplement recommender system. Another shortcoming of the content based recommender system is that it is designed to recommend mostly text-based products, thus it is only able to perform recommendation in restricted domain like news, web pages and articles [1]. Variety of information retrieval techniques such as clustering [16], TF/IDF [17] and association rule mining [18] have been used to tackle the content based problems. Many researchers such as [1, 19] amongst others define the hybrid recommender system as a technique or approach that applies to two or more recommendation techniques. Usually content based technique along with collaborative

filtering has performed better than traditional recommendation techniques applied in isolation [9].

Several ways have been proposed for combining them to create a new hybrid system [9]. Early works [19] on hybrid recommender system describes variety of techniques for recommendations like collaborative, content based, knowledge-based and other techniques. To improve performance these techniques have sometimes been combined in hybrid recommenders. They [19] also introduce a novel hybrid system, Entree C a system that combines collaborative filtering and knowledge based technique to recommend restaurants.

V. PROPOSED WORK

With the expansion of E-commerce, more and more people are buying large amount of items on the internet. In order to enhance their experience and satisfaction, it has become a common practice for online providers to enable their customers to review or to express opinion on the products that they buy. With more and more peoples becoming comfortable with the internet, reviews are written by large number of peoples. As a result, the popular product gets thousands of reviews at some large provider sites. This makes it hard for the customers to read all of them; hardly customers can read ten to fifteen reviews. So there should be a comprehensive approach where we could utilize these reviews for efficient recommendation. Figure-4 provides an overview of the architecture of proposed recommender system technique based on opinions.

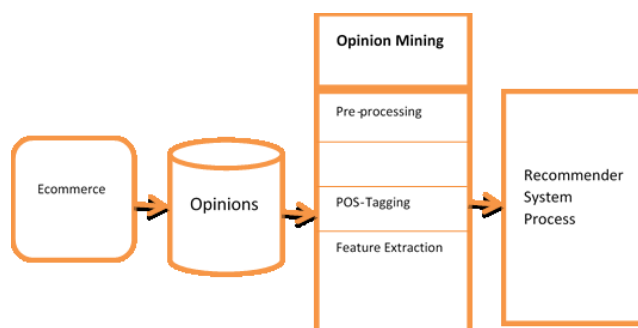


Figure 2. Proposed Technique For Recommender System

Data Collection: - In this step collection of user's opinions from E-Commerce websites shall be performed using any data extraction technique.

Opinion Mining: - Opinion mining is a combination of text mining and natural language processing. It uses supervised and unsupervised methods to evaluate the opinions and classify them as negative or positive. Extraction of features, defining polarity and assigning score can be performed in the following sub modules.

- Pre-processing: The data preparation step cleaning of the dataset. Some commonly used pre-processing steps include removing non-textual contents and mark-up tags.
- POS Tagging: - Part of speech tagger parses a sentence and tags each term with its part-of-speech. For POS tagging, we can use POS tagger like The Standard POS Tagger or NLTK POS Tagger.
- Feature extraction: - Extraction of all those features from opinions is performed on which users have commented. To perform this task we can use POS tagging, etc.
- Defining polarity and assigning weight: To identify the polarity we will use supervised or unsupervised techniques like SentiwordNet, Naïve Bayes, Textblob etc.

Rating Fusion: - The computed rating from reviews of the item shall be fused with the numerical or star ratings.

Recommender Process: In the recommender process we propose to use KNN or any other similar approach for recommendation of items.

VI. CONCLUSION

Recommender Systems have become an important tool of many Social media like Amazon, Netflix, YouTube, etc. They have a variety of approaches for recommending movies, music, restaurants, grocery stores etc. Instead of choosing an item from a physical store now people prefer from millions of items available on the online. Recommendation system makes the job of the online user very easy by presenting a series of items which could be of interest to a user. In this paper, Recommender system, its techniques, various limitations and the

proposed framework for recommendation of products based on opinions have been presented.

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