

Recommender Systems - A Numerical Approach

Nishtha Srivastava

Department of Computer Science, Vadodara Institute of Engineering, Baroda, Gujarat, India

ABSTRACT

The recommender systems are predictions of what we search on internet. For example , if we do online shopping on some shopping website , it will show us that product's recommendations on another web page for example face book. This document basically talks about how these predictions/recommendations are made.

Keywords : Prediction, Information Retrival, Collaborative Filtering, Ratings

I. INTRODUCTION

Recommendation system is a type of information filtering system. The main aim of recommender system is to help to estimate the 'rating' that a customer would provide for a product.

A. Need for Recommender Systems

For any E-commerce web or mobile ,too much information on internet leads to overloading on the web , al-though this overloading of information provides many options to the customer using that particular e-commerce website. In order to avoid this overloading , we use recommender systems. A recommendation system provides recommendation to the customers and make their work easy. Recommendation can be of many types for example book, movie , kitchen accessories , home , music etc.

B. How is it helpful to the customer ?

- Zero down on the set of choices
- Help them to explore new things
- To know more about their interest of things which they can order next time
- Clear confusion about which item/product to choose next

II. DIFFERENCE BETWEEN RECOMMENDATIONS AND PREDICTION

Recommendation is like a suggestion given by the

recommender system for the product which you are buying. Prediction roughly calculates how much you like item.

III. ARCHITECTURE OF RECOMMENDATION SYSTEM

Recommendation if seen as a function consists of three things : Input , Findings and the Output. Findings is the relevant score between the two products which you want to recommend. In case of movies, we can see that movie ids, user ids and rating for a particular movie are stored in the application database. In the server , we have implemented location based algorithm to recommend items .The application server(in our case it is TomCat) take help of web server via a web server to reach its web client (customer) . Web client might be using any E-commerce application like Amazon , to purchase an item. TomCat server also seeks help from third party organization like Facebook and Twitter.

IV. TYPES OF RECOMMENDATIONS

Recommendations can be of various types:

- Item-Item : e.g. Shopping basket , online shopping
- User-User :e.g. Finding users with similar likes..
- Attribute-Attribute:e.g. It is based on the syntactic attributes of a product. Fiction books, here attribute is Fiction

A. Binary Actions

Binary actions are the attributes which help in recommending a product to the user. These attributes include , click on link , do not click on link,purchase , follow a friend , like , comment and vote.

V. RECOMMENDATION TECHNOLOGIES

Information retrieval (IR) systems:

- Allow users to express queries to retrieve information relevant to a topic of interest or fulfil an information need
- They are not useful in the actual recommendation process
- They cannot capture any information about the users' preferences
- They cannot retrieve documents based on opinions or quality as they are text-based

To address these issues two techniques have been developed:

- Content-based filtering (Information filtering)
- Collaborative-based filtering
- Knowledge base recommendation systems

A. Content Based Filtering

The system processes information from various sources and tries to extract useful elements about its content. It is keyword-based search (keywords sometimes in boolean form).It uses semantic-information extraction by using associative networks of keywords, or directed graphs of words.

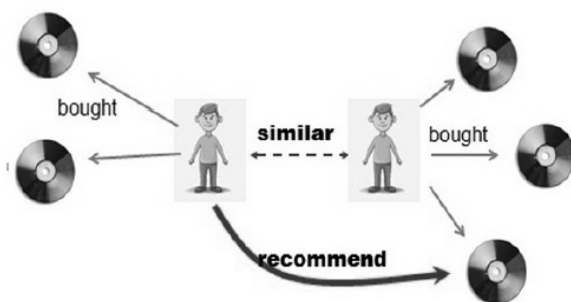


Figure 1. Content Base Filtering example . When person , say Ram buys the same set of 2 music CDs and at the same time person , say Ramesh brings 3 music Cds. Should we recommend Ram the same 3rd CD which Ramesh bought.

B. Collaborative Filtering

It is the most prominent approach to generate recommendations. Basically , used by large, commercial e-commerce site. Also it is well-understood, various algorithms and variations exist. This approach of recommendation is applicable in many domains (book, movies, DVDs, ..)

The basic assumption and idea is :

- Users give ratings to catalog items (implicitly or explicitly)
- Customers who had similar tastes in the past, will have similar tastes in the future

C. Using collaborative filtering using user-based nearest neighbour

	Item 1	Item 2	Item 3	Item 4	Item 5
Alice	5	3	4	4	?
User 1	3	1	2	3	3
User 2	4	3	4	3	5
User 3	3	3	1	5	4
User 4	1	5	5	2	1

Figure. 2. Collaborative Filtering Example of comparing 2 items

The basic technique is ,given an "active user" (Alice) and an item 1 not yet seen by Alice.Now the goal is to estimate Alice's rating for this item, e.g., by find a set of users (peers) who liked the same items as Alice in the past and who have rated item 1, use, e.g. the average of their ratings to predict, if Alice will like item 1 then do this for all items Alice has not seen and recommend the best-rated.

D. Pearson Correlation

It is a popular similarity measure in user based collaborative filtering.

$$sim(a, b) = \frac{\sum_{p \in P} (r_{a,p} - \bar{r}_a)(r_{b,p} - \bar{r}_b)}{\sqrt{\sum_{p \in P} (r_{a,p} - \bar{r}_a)^2} \sqrt{\sum_{p \in P} (r_{b,p} - \bar{r}_b)^2}}$$

Figure 3. Pearson formula

a, b : users

$r_{a,p}$: rating of user a for item p

P : set of items, rated both by a and b

Possible similarity values between -1 and 1

V. CONCLUSION

Recommendation based on the input from the user is a very difficult task and sometimes might be confusing also. The best way to find recommendation is the use the Pearson Correlation which come under collaborative filtering type. It give us the exact similarity number between the two items which we want to compare.

VI. REFERENCES

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About The Author Professor Nishtha Srivastva is currently working as an Assistant Professor at Vadodara Institute of Engineering , Vadodara. She has completed her M.Tech from Nirma Institute of Engineering in CSE(Computer Science and Engineering) in 2017.She also has 2 years working industrial experience in Oracle , Bangalore and Rishabh Softwares , Vadodara.You can contact her at : nishtha8080@gmail.com/15mcec28@nirmauni.ac.in.