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Relevance Model for Business Growth Using Product Recommendation

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Abstract: ***The communication between E-commerce website and social media site has become more unclear. Most of the social media sites like Facebook. Google+, twitter, etc. support to login E-commerce sites. The user can use social media sites, and send a link to the purchased product from E-commerce websites. The paper presents a system that uses cross-site cold star product recommendation. The objective of this methodology is to recommend the purchased product details from E-commerce site to social media site. The major challenge in this methodology is to manage the extracted data from the social media site for the cross-site cold star product recommendation. The paper presents a method to use the link between social media site and E-commerce site as a bridge. The method uses the reviews of the customer given for the products through social media. Apply NLP on the product reviews for product rating.***
Keywords: Item-based filtering, collaborative filtering, NLP, Hybrid based collaborative filtering, Memory based Collaborative filtering.

I. INTRODUCTION

Nowadays online business is being popular there are many people who shop online rather than in-store. E-commerce business has ability to connect to the customers through the web. There are many advantages of e-commerce business. People use social media to share the experience of the products or items they have used. These experiences are used by the new customers before shopping. The same way these feedbacks can be used to improve the e-commerce business. To achieve this, there should be link between e-commerce business and social media

The paper presents a business model that can be designed using product recommendation given by the customers in e-commerce websites through the social media. The product recommendation is focused on building a solution to the social media site and spread the transaction record.The paper presents the study about the information of social media and challenges in using that information to the transfer the information into hidden user feature for the product recommendation.The information from social media is extracted using the microblogging data feature from feature based matrix factorization.After that, it is transferred into the distributed feature representation.

II. RELATED WORK

The system uses a collaborative filtering (CF) technique for the product recommendation it is commonly used to modify recommendation form on the web. There are some popular websites, or companies used this technique like IMDB, Netflix, Amazon, iTunes, Last FM, Stumble Upon, Delicious. In this collaborative filtering algorithm used to create automatic estimate about the users which interested by collecting favourite from some of the users.

Customer if uses Amazon website to purchase a product A, product B and C as well, product are same which is recommended. This product purchase are done by comparing purchase history of those who have same purchase product. [2]

Wayne Xin Zhao had developed social media and e-commerce website for the product recommendation in the cold star process situation. The recurrent neural network and the product technique was to learn connected feature representation. To display the dynamic temporal network connection between the units in directed cycle. The e-commerce systems need to use gradient boosting tree method to transfer the users, reviews associated for product recommendation from social media to an e-commerce website. It is a machine learning strategy for relapse and arrangement issues. Regression is the measure of the connection between the mean estimation of one variable (e.g., output) and Corresponding estimation of other variable (eg: time and cost) or a return to a previous or less developed state. For the cold star product recommendation feature based matrix factorization approach is instantiated by joining user and item feature.

Previous system used this attribute but in this system cannot use demographic attribute. Because cannot find the users according there specific attribute.Demographic attribute like “gender” are considered in an earlier research. Demographic attribute are used to find out the more fine-grained information. In previous paper describe the collaborative method in the random forest which shows a

selection of random features. Each attribute has its important score using the demographic attribute extraction. Separating entire characteristics instead of extrication portion of qualities in view of significance score of each attribute. It selects its related attribute value feature after selection of attribute. The significance score of each attribute is set to the extent of the characteristics that have its value posted to the user's social media profile. In present system used the purchase intend tweets, extract tweets information and product recommendation which is describe in presented paper [1]

III.SYSTEM DESCRIPTION

In the presented system Item-based collaborative filtering algorithm are used to the similarity of rating and to display the review the product recommendation in the system. In this system give the product recommendation to the social media users from e-commerce web site. Collaborative filtering algorithm are used to give product recommendation. In this system give the product recommendation to social media users but to those users which are log in with e-commerce site also. Then the e-commerce users purchase the product and share the product review on the social media site. Fig shows the workflow to a product recommendation. It describe the how to extract tweets from the social media site which is shared by the e-commerce website purchase users. After using the item based collaborating filtering algorithm for the similarity and rating/ ranking of that products. In item-based collaborative filtering measure the similarity of purchase product and reviews of that product.

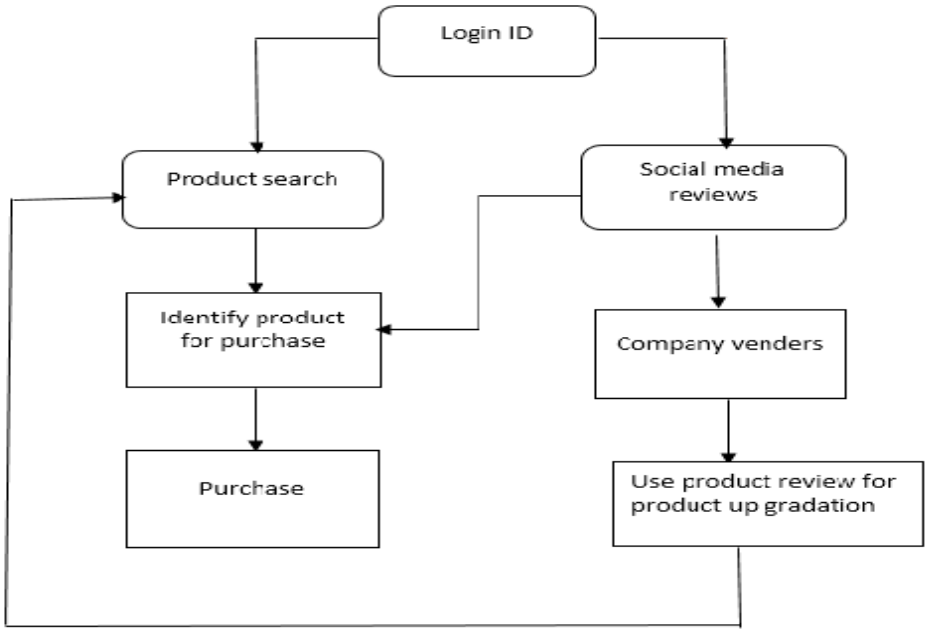

Fig 1. Workflow for tweet extraction and product recommendation

The popular recommendation algorithm is Collaborative filtering which is based on the behavior of users to the calculation of rating and recommendation on the rating. In this algorithm important statement is for the active users to give the selected opinions to the users to gather for providing the reasonable calculation. Naturally, the users assume that, if some user are agree about the importance and quality of the product than the others also agree about the product, if there is a group of people who like the product which is like by the someone but that person are not yet seen that product. For this reason, there is another method to find out the recommendation which is given by the others in the metadata in textual similarity is content-based filtering. If there is a difficulty to find recommender system than we discuss that time about the contact-based filtering currently focus on collaborative filtering method.The popular facility in collaborative filtering method, this method operate by the user creating an estimate of user first choice by ranking users product from the estimate than produce product recommendation. The estimate is in the equivalent measure of rating which is provided by users, but rarely estimate is in the different rule and meaningful only for those users who give a ranking. Produced significance score for the document and product for the quality of product with the respective request and present the top score product in common information retrieval method. Product recommendation task is view like information retrieval problem. [1]

Following are different types of collaborative filtering:

1) Memory-Based: The type of filtering used to analyse the similarity between the product and user this method used from the user's score information. Analysed similarity are used to make a product recommendation.
2) Model-Based: The filtering process carried out on the basis of the rating of data set create a model in Model-based recommendation systems**.** In simple words, from the dataset extracted user information, information use as a model for the recommendations every time without using complete dataset.
3) Hybrid: Combination of many programs of both algorithm model-based and memory-based CF.

A. Item-based collaborative filtering:

Item-based collaborative filtering is used for the product recommendation process, and it is also called model-based algorithm. Calculate the similarity between the different products in the dataset by using similarity measure, after that expect rating for user-product sets which is not presented in data set by using the similarity value.

B. Similarities between products:

Observed by-products rate users' measured the similarity value between products. Two products similarity depends on rating which is given to the product by users who rated both the products.

C. Similarity measures

There is lots of deferent mathematical formula to calculate the similarity of two product. There is a formula below; each formula has included some terms above the set of common users U.

1) *Cosine-based similarity:* Cosine based similarity also called vector-based similarity, in this formulization view rating of two products as a vector, and similarity defines between two products as the angle between vectors. Officially, in the m × n rating matrix, similarity between products i and j, denoted by sim (i, j) is given by

$$sim(i,j) = \cos(\vec{i},\vec{j}) = \frac{\vec{i}\cdot\vec{j}}{\|\vec{i}\|_2 * \|\vec{j}\|_2}$$

Where "·" denotes the dot-product of the two vectors

2) *Pearson (correlation)-based similarity:* Depart from the average ratings of product similarity measure for the pair of products based on how much rating is given by the common users.
3) *Adjusted cosine similarity:* It is a modified similarity measurement from the vector-based similarity takes different rating from the different users. In simple word says that some users might have given a high rating, and some users give a low rating to the product as a favorite. This is a drawback of vector base similarity to remove this subtract the average rating.

D. Model predictions

Using the similarity measure of above which is described to make a model, using the idea of weighted sum users and product pairs rating is predicted. Take an example of all product which is similar to the target product and from that similar product, from that we pick one of them which user has purchase first and give the highest rating. Calculate the users rating for each of the product by the similarity between the target products. Finally get the actual sum of the product rating scaling the estimate by the sum of similarities to get the value.

$$P_{u,i} = \frac{\sum_{\text{all similar items, N}}(s_{i,N} * R_{u,N})}{\sum_{\text{all similar items, N}}(|s_{i,N}|)}$$

Each rating are weighted by the corresponding similarity s i,j between items i and j. Formally, using the notion denote the prediction Pu, i as[5]

After applied item-based collaborative filtering method get the comments and rating. On that comments apply NLP. [3] [4] The use of NLP is, to translate the comments into the calculation how to grow the business. It shows the online business growth. It

shows how many positive scores for the similar and different products. It shows how many negative scores, natural score and compound score for the products as shown in below.

TABLE I
PRODUCT RATING SCORE

Sr. No.	Details	Rating
1	Positive score	0
2	Negative score	0.709
3	Natural score	0.294
4	Compound score	-0.3412

1) Implementation

Using this below parameter implemented item-based collaborative filtering:

a) Adjusted cosine-based similarity

b) For each product pair, there is a minimum number of users.

c) Numbers product are stored.

2) Challenges

The first challenge in the calculation of adjusted cosine similarity measure problem occurs, in the case of there is only one user common in process. If remove the average rating for users than the common user is 1 for the product in adjusted cosine similarity, and that value is highest possibility value. Result for such product is common in a created dataset, because of one user rating the product is wind up. The solution is implemented for the numbers of users at least two users are needed to rate the product for the similarity.

The second challenge introduces calculate users and product pairs rating for a test when weighted sum used. Than stored the similar 50 products for each product, and for each target product, consider that product which has seen by the active user, it frequently happens with the created dataset in that there are many much products for many much users. Than this dataset results in the bad calculation for the large test set.

3) Algorithms Criteria: There is some important criteria which is define how the algorithm is useful:

a) Quality of Predictions: For the average rating of the product use the global data from the dumb calculation of algorithm for the better performance. It's true to want recommenders for the good recommendations.

b) Speed/Scalability: Recommender systems work in a commercial and online, that why it is important to make recommendations for users instantly. In this algorithm means it cannot take a long time to make any calculation of rating. Algorithm Scalability is related directly to the speed. Recommender systems in a commercial and online have a big dataset. Speed maintain in this algorithm if there having numbers of rating.

c) Dataset Easily Updated: Dataset is constantly updated in the recommender system from users with updated ratings. And this type of algorithm is used to handle this type of updated information. If model required in the algorithm and it takes time to build, that it might be missing the several information and miss out to make a recommendation.[5]

IV. CONCLUSIONS

The system gives solutions to the problem, i.e., cross-site cold start product recommendation. This means that posting product recommendation from E-commerce website to social media without any historical purchase record. The primary idea is that user can represent a recommendation of a certain product on social media from the E-commerce website. Developed sample E-commerce website in our implementation. In the final result of the proposed system shows the efficiency of implemented work.

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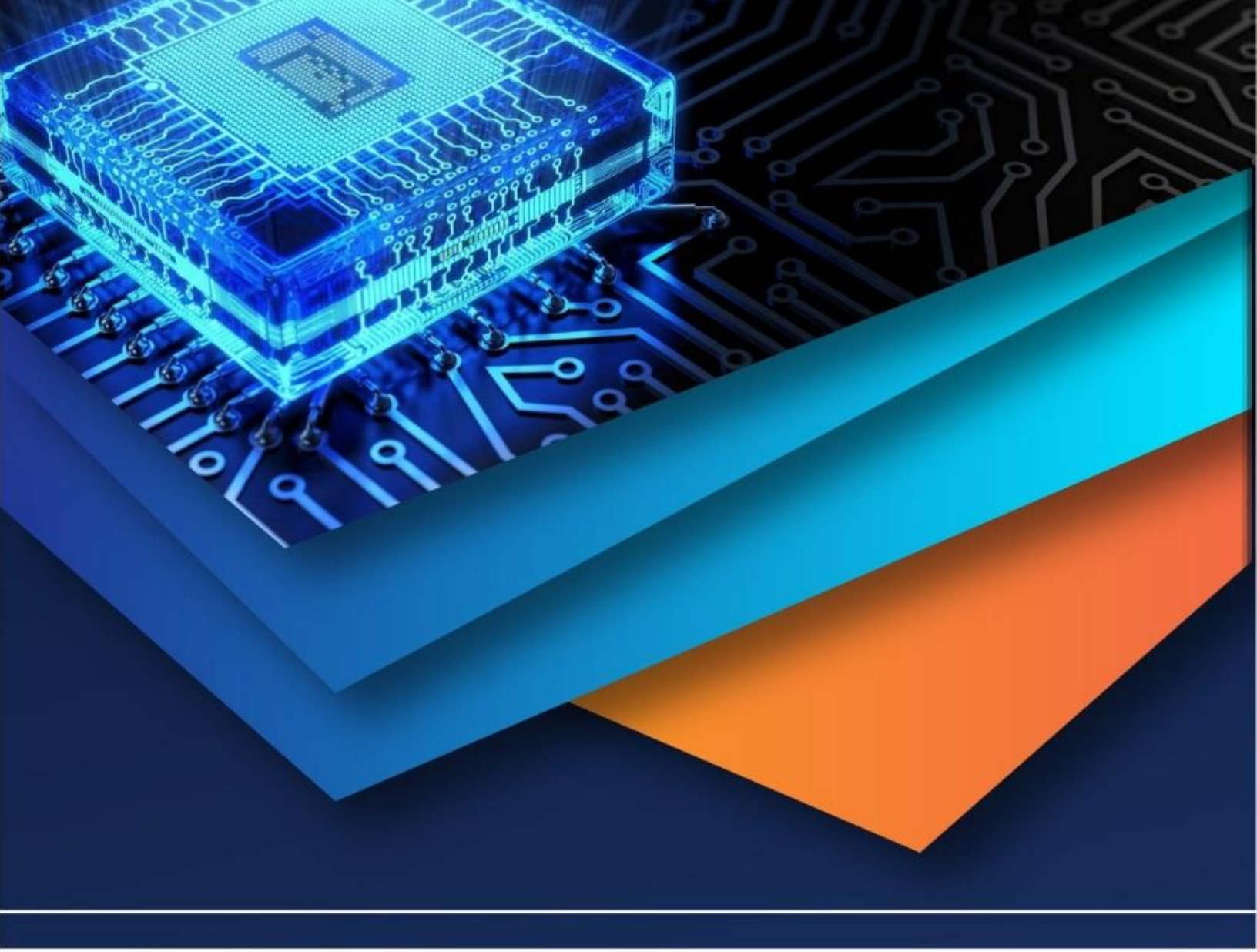

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