A Result Review Analysis of Product Recommendation System in Domain Sensitive Manner

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ABSTRACT: With the wide variety of products and services available on the web, it is difficult for users to choose the product or service that most meets their needs. In order to reduce or even eliminate this difficulty, recommender systems have emerged. A recommender system is used in various fields to recommend items of interest to users. One of the main areas where this concept is currently used is e-commerce that interacts directly with customers by suggesting products of interest with the aim of improving its sales. Motivated by the observation, a novel Domain-sensitive Recommendation (DsRec) algorithm is proposed, to make the rating prediction by exploring the user-item subgroup analysis simultaneously, in which a user-item subgroup is deemed as a domain consisting of a subset of items with similar attributes and a subset of users who have interests in these items. Collaborative Filtering (CF) is an effective and widely adopted recommendation approach. Different from content-based recommender systems which rely on the profiles of users and items for predictions, CF approaches make predictions by only utilizing the user-item interaction information such as transaction history or item satisfaction expressed in ratings, etc.

I. INTRODUCTION

Recommender systems are considered one of the most common ways of personalization and online search popular in recent years. The traditional recommender system has different criteria for users such as user's preferences or user's profile. Deep learning techniques with the recommender system can have good results in many areas such as computer vision, voice recognizer, and language processing [1]. The basis of deep learning is imperative in the classification of complex data to improve the understanding that would come from them. Deep learning is known as deep structured learning. It is a new field of machine learning research and helps modelling data on multiple levels and can discover interactions and correlation between different types of structured and unstructured data, including, image, sound, and text data at a deeper level [2].

The recommendation system can effectively help users filter irrelevant information, find information of interest to them, and improve the utilization of information by analysing and mining relevant information about users and commodities. The recommended collaborative filtering recommendation (CF) by analysing existing user behaviours and information is widely used in the industry [3].

Collaborative Filtering (CF) is mainly categorized into two types - memory-based and model-based. In memory-based collaborative filtering the similarity for users or items is computed using rating information and recommendation is provided. Whereas, different machine learning and mathematical models are used in model-based collaborative filtering to learn from rating [4].

In the collaborative filtering approach, the RS would analyse users who have similar tastes, and come up with things which the similar users favour. Because of the cold-start problem, this approach would neglect the things which nobody in the group has rated beforehand [7].

Product recommendation is drastically changing the revenue of e-Commerce companies like Amazon. It has estimated that product recommendation is playing a key role in the percentage of revenue generated by these e-Commerce companies yearly. Product recommendation is a vast area covering a different aspect of user expectation, behaviour, needs interest, etc. Person visiting e-Commerce website say Amazon.com and searching for some specific product [8].

Product recommendation systems are widely used in today's digital marketing. It provides convenient for customers and help customers to make decision easier compared to the conventional approach which recommended by the product experts. A good product recommendation system can promote the sell dominantly. However, recommending the right products to the customers is not an easy task. Similar to product recommendation by the experts which requires intensive training, product

recommendation system requires knowledge about the products and more importantly, it must be able to process customer's input data and interpret the collected information into useful recommendation [10].

II. BACKGROUND AND RELATED WORK

Many research works have investigated the problems related to the Context Aware Recommendation System. Most of the solutions deal with the problem of incorporating the contextual information. A novel Domain-sensitive Recommendation (DsRec) algorithm is proposed to make the rating prediction by exploring the user-item subgroup analysis simultaneously, in which a user-item subgroup is deemed as a domain consisting of a subset of items with similar attributes and a subset of users who have interests in these items. Extensive experiments on Movielens-100K and two real-world product review datasets show that our method achieves the better performance in terms of prediction accuracy criterion over the state-of-the-art methods [11]. There are two fundamental challenges. First is to improve the scalability of the collaborative filtering algorithms. Second is to improve the quality of recommendations for the users. These two challenges are in conflict since the less time an algorithm spends searching for neighbours, the more scalable it will be, and the worst its quality. Here, these issues are addressed by applying an approach- item-based algorithm. Item-based algorithms avoid this bottleneck by exploring the relationship between users [12]. To acquire confident contextual information, a user study is performed where participants were asked to rate movies, stating the time and social companion with which they preferred to watch the rated movies [13]. Several scholars have shown that adding contextual information helps to improve performance of RSs. This scheme focuses on comparing the pre-filtering and the post-filtering approaches and identifying which method dominates the other and under which circumstances. Since there are no clear winners in this comparison, an alternative more effective method of selecting the winners is proposed in the pre- vs. the post-filtering comparison [14]. Distributional-Semantics Pre-filtering (DSPF) is analogous to Generalized Pre-filtering: it is a reduction-based approach, but instead of searching for the optimal segmentation of the ratings, it exploits similarities between situations to generate segments that aggregate the ratings tagged with situations similar to the target one [15].

III. PROPOSED METHODOLOGY

Modelling is the representation of a method which is used by simulation. Models may be mathematical, physical, or logical representations of a system, entity, phenomenon, or process. Models are, in turn, used by simulation to predict a future state. The Models of proposed method are as follows:

➢ **Domain-sensitive Recommendation Systems**

Input   **:** Any real time database of e-commerce website.

Output:

    a. Rating prediction model.
    b. Domain detection model.
    c. Regression regularization terms
    d. Group of Item Analysis

Algorithm

Step 1: Create user account

Step 2: Login to user account

Step 3: Searching of items

Step 4: View product of interest

Step 5: Store user searching history in database

Step 7: If user=new then go to step 1 and repeat the procedure

  Else

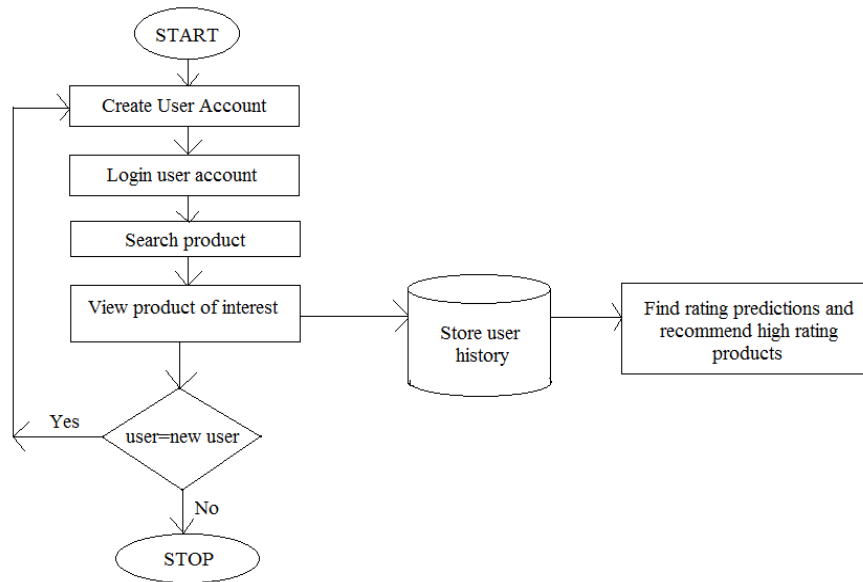Step 8: Find the ratings and recommend top rating products

Fig 3: Flowchart of DsRec algorithm

Implementation of Proposed Work

Implementation encompasses all the processes involved in getting new software or hardware operating properly in its environment, including installation, configuration, and running, testing, and making necessary changes. As such, implementation is the action that must be followed by users as any preliminary things in order to see how it works.

The issues considered for implementing new approach are,

1) Prediction Calculation Time

It considers the processing time of calculation using the contextual information to find the appropriate rating predictions. If the prediction calculation requires more time for ratings then performance of method will decrease.

2) Prediction Quality

It considers the quality of the predictions required in the recommendation systems. If the quality of the predictions is bad, then performance will decrease.

IV. RESULT ANALYSIS

This part focuses on result and its analysis based on the tools used for this method. The tools help in analyzing the user and the admin analysis graphs which help both user and the admin to know which products are the topic of discussion recently. To evaluate the behavior of the user the parameters like user interest, count, user reviews are used.

An example to show the analysis is given below.
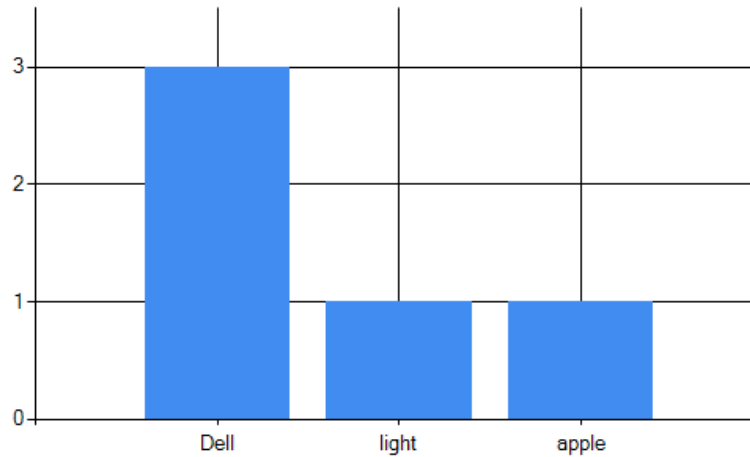
Search Analysis

Fig 4: Result of Analysis

This analysis is nothing but the graph between name of product and count. The count is no. of reviews on the product. These graphs shows the top products which are more discussed among users. This recommends users the top product and helps user to choose better product.

A. Advantages

  1. The performance is better in terms of quality and time.

  2. It provides the better use of the database which store user and product history.

  3. Quality prediction, **Scalability, Prediction, speed are the main advantages of the   proposed scheme.**

V. CONCLUSION

Recommender Systems have been widely used to exhibit the most appropriate items to users given their past consumption preferences. Recommendation systems are achieving great success in e-Commerce applications, during a live interaction with a customer; recommendation system may apply different techniques to solve the problem of making a correct and relevant product recommendation. Deep learning techniques with different neural network architectures can be applied to the recommendation systems to identify the different patterns and behaviours of the customers in e-commerce applications. The recommended collaborative filtering recommendation (CF) by analysing existing user behaviours and information is widely used in the industry. In this paper, a analysis recommendation system is constructed that ensembles deep neural network. This paper proposes a result analysis of deep learning-based framework for augmenting the collaborative-filtering based recommendation systems. In future, this model for explicit feedback will be revised changing the number of latent factors for user and item embedding and performance of the model will be reviewed.

REFERENCES

[1] Devika Anil; Anagha Vembar ; Srinidhi Hiriyannaiah ; Siddesh GM ; KG Srinivasa," Performance Analysis of Deep Learning Architectures for Recommendation Systems," IEEE 25th International Conference on High Performance Computing Workshops (HiPCW), Dec 2018.

[2] Maram Almaghrabi ; Girija Chetty," A Deep Learning Based Collaborative Neural Network Framework for Recommender System", International Conference on Machine Learning and Data Engineering (iCMLDE),Dec 2018.

[3] Jia Du; Lin Li ; Peng Gu ; Qing Xie," A Group Recommendation Approach Based on Neural Network Collaborative Filtering," IEEE 35th International Conference on Data Engineering Workshops (ICDEW),April 2019.

[4] Mohammad Tusher Ahamed; Shyla Afroge, "A Recommender System Based on Deep Neural Network and Matrix Factorization for Collaborative Filtering", International Conference on Electrical, Computer and Communication Engineering (ECCE), Feb 2019.

[5] Bishwajit Purkaystha; Tapos Datta; Md Saiful Islam; Marium-E-Jannat," Product recommendation: A deep learning factorization method using separate learners", 20th International Conference of Computer and Information Technology (ICCIT), Dec 2017.

[6] João Felipe Guedes da Silva ; Natanael Nunes de Moura Junior ; Luiz Pereira Caloba," Effects of Data Sparsity on Recommender Systems based on Collaborative Filtering", International Joint Conference on Neural Networks (IJCNN), July 2018.

[7] Rohan Passi," Recommending Items Using Collectively Trained Models", International Conference on Information Technology (ICIT), Dec 2017.

[8] Babak Maleki Shoja; Nasseh Tabrizi," Customer Reviews Analysis With Deep Neural Networks for E-Commerce Recommender Systems", IEEE access, volume 7, Sept, 2019.

[9] Rahul Shrivastava; Dilip Singh Sisodia," Product Recommendations Using Textual Similarity Based Learning Models," International Conference on Computer Communication and Informatics (ICCCI),Jan 2019.

[10] Udom Janjarassuk; Sudatip Puengrusme," Product recommendation based on genetic algorithm," 5th International Conference on Engineering, Applied Sciences and Technology (ICEAST), July 2019.

[11] T. George and S. Merugu, "A scalable collaborative filtering framework based on co-clustering," in Proc. 5th IEEE Int. Conf. Data Mining, 2005, pp. 625–628.

[12] B. M. Sarwar, G. Karypis, J. A. Konstan, and J. Reidl, "Item-based collaborative filtering recommendation algorithms," in Proc. 10th Int. World Wide Web Conf., 2001, pp. 285–295.

[13] T. Hofmann and J. Puzicha, "Latent class models for collaborative filtering," in Proc. 6th Int. Joint Conf. Artif. Intell., 1999, pp. 688–693.

[14] S. Zhang, W. Wang, J. Ford, and F. Makedon, "Learning from incomplete ratings using non-negative matrix factorization," in Proc. 6th SIAM Int. Conf. Data Mining, 2006, pp. 549–553.

[15] I. Esslimani, A. Brun, and A. Boyer, "A collaborative filtering approach combining clustering and navigational based correlations," in Proc. 5th Int. Conf. Web Inf. Syst. Technol., 2009, pp. 364–369.