International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 06 Issue: 03 | Mar 2019 www.irjet.net p-ISSN: 2395-0072

A new approach to product recommendation systems

Mrs.V. Rekha Senthilkumar[1] , C.Rahul Kiron[2] , M.Vishnuvarthan[3] , M.Vishnu kumar[4]

[1] Assistant Professor, Dept. of Computer Science and Engineering, Easwari Engineering College, Tamil Nadu, India &
[2,]Pursuing B.E Computer Science Degree from Easwari Engineering College, Tamil Nadu,India & rahulkiron23@gmail.com
[3,]Pursuing B.E Computer Science Degree from Easwari Engineering College, Tamil Nadu,India & vishnuvarthanm11@gmail.com
[4,]Pursuing B.E Computer Science Degree from Easwari Engineering College, Tamil Nadu,India & vishnukumara33a@gmail.com

---

Abstract - *The E-commerce is a large industry. It accounts to nearly 70% of the purchases done in this world. Here several millions products are listed online by the sellers. Then the user could search for a specific product in the site. If it is available, it could be purchased. Since, there are a lot of products available for a consumer, the choice of selection is huge. So in some cases, the users won't even know there exists a better or more relevant product for their needs. In order to solve this issue E-commerce sites use several different strategies to do recommendation for the user. But the main concern in today's world is many sites are business motivated and could be suggesting a different product. Also right now, most of the recommendations are based on a specific user's personal interest. The motivation of this project is to find similar users and suggest a products per their rating, also their dislikes could be used to recommend the product to another user. Also, we implement a verification step to post reviews for the purchased product online to ensure it is genuine. This makes sure that, only the users who have used a product from the seller can post their opinions.*

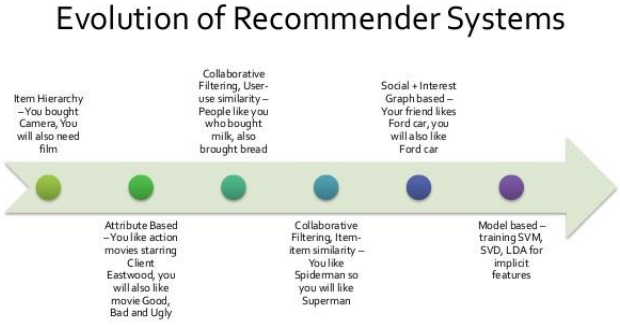
Key Words: **Recommender systems , Big Data, Data analytics, Prediction techniques, E-commerce .**

1.INTRODUCTION

The world now uses e-commerce to the fullest. Companies initially started to sell niche items online. But due to its convenience and ease, all the products were stocked online for sales. This gave rise to giant e-commerce sites like amazon, flipkart, etc. This also gave rise to several manufacturers whose only presence were online. Due to this, several thousand new products are arriving online everyday.

This creates a confusion among the consumers while purchasing a product. Right now, Users use the previous customer's review and rating to do a purchase. If the existing ratings are high for a particular product. It has a higher chance of being sold. Also several recommendations can be made to a customer, whose likes are similar to other customers.

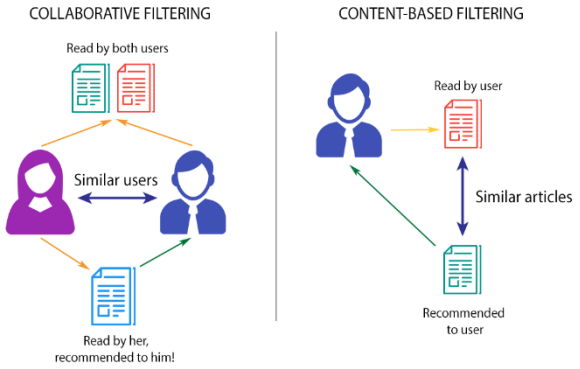
This also has given rise to several fake reviews, which are being published online every day for a product. This is mainly done by the competitors in a particular sector. The important concept is to create recommendation system which is able to suggest the most relevant product based on the interests of a user.



The recommender system as seen above has been evolved immensely in the past few years. Also, new algorithms and implementations are being found and implemented for better prediction frequently. So, a recommender system plays a key role among the users. This is not only used for online sales but due to boom in the online streaming services recently, tech companies such as google who owns youtube and the most popular online tv show streaming service netflix depend a lot on their recommendation system.

The correct recommendation to a user can generate more sales. In case of the streaming service it could add more loyal subscribers to the platform. The main hurdle for the companies is to find which product or service is meant for a customer, since all the users

are unique, companies have to rely on the existing information to make any further recommendation to users.



The current most popular way of doing this is to group users based on their interests. The interests here are their previous purchases for products or genre in case of other recommendations.

2. LITERATURE SURVEY

Qi, L., Xu, X., Zhang, X., Dou, W., Hu, C., Zhou, Y., & Yu, J. (2016). Structural Balance Theory-based E-commerce Recommendation over Big Rating Data. IEEE Transactions on Big Data, 1–1.doi:10.1109/tbdata.2016.2602849. The current system uses the traditional collaborative filtering method. This paper suggests a unique approach to the system. Here, the system is based on the famous saying "Enemy of my enemy is my friend", this system finds several opposite clusters to our enemy set and then enhances the recommendation. This leads to unique recommendations which are not found by the current system.

Liu, J., Jiang, Y., Li, Z., Zhang, X., & Lu, H. (2016). Domain-Sensitive Recommendation with User-Item Subgroup Analysis. IEEE Transactions on Knowledge and Data Engineering, 28(4), 939–950.doi:10.1109/tkde.2015.2492540.In this mentioned paper,the objective is to use Collaborative Filtering approach for recommender system. Typical Collaborative Filtering mechanism treats the user and the item as the same, there is no key differences established between them. In this paper, the proposed algorithm (DsRec), finds the difference by analysing and exploring the user and item subgroup. The problem here is there is very few data available for the users. So, the prediction made is not the accurate one.

Cai, Y., Leung, H., Li, Q., Tang, J., & Li, J. (2010). TyCo: Towards Typicality-based Collaborative Filtering Recommendation. 2010 22nd IEEE International Conference on Tools with Artificial Intelligence.doi:10.1109/ictai.2010.89.The outcome here is the formation of a collaborative filtering recommendation system based on typicality known as TyCo. The system could selects similar clusters 'neighbours' of a user cluster based on degrees of typicality. The problem is there is no known method to assign the required resources to find item groups for the required user cluster groups.

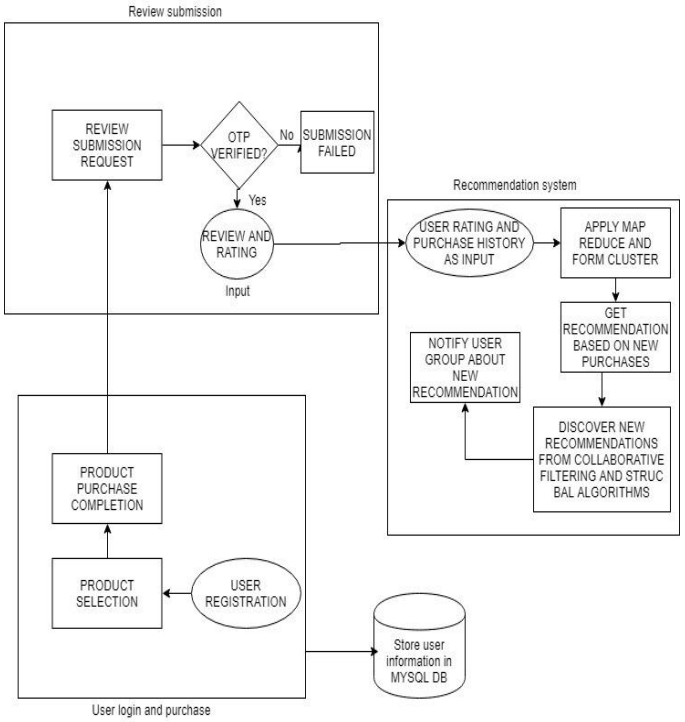
Hernandez, S., Alvarez, P., Fabra, J., & Ezpeleta, J. (2017). Analysis of Users' Behavior in Structured e-Commerce Websites. IEEE Access, 5, 11941–11958. doi:10.1109/access.2017.2707600.In the proposed system, the model uses a checking approach to analyse the structured web logs for an e-commerce website. The problem here is it affects the performance, which could affect the loading time for certain users.

Lei, X., Qian, X., & Zhao, G. (2016). *Rating Prediction Based on Social Sentiment From Textual Reviews. IEEE Transactions on Multimedia,18(9),1910–1921.*doi:10.1109/tmm.2016.2575738. The proposed system, is making sure that the user sentiment plays a key value for their recommendation. The system measures the sentimental factor and calculates each sentiment for the items based on their reviews.

Shaikh, S., Rathi, S., & Janrao, P. (2017). *Recommendation System in E-Commerce Websites: A Graph Based Approached. 2017 IEEE 7th International Advance Computing Conference (IACC).*doi:10.1109/iacc.2017.0189.The current system lacks a semantic factor for the recommendation process. As there are three types of recommender systems, it is important to implement a semantic factor to enhance the recommendation. This paper explains the improved outcome by the inclusion of the relevant factor for the system.

3.PROPOSED SYSTEM

The proposed system working is based on the functional architecture given below:



The interface of the system can be implemented in the form of a web application. The newer technology such as React native can be used to create an application which can support multiple new databases. For our system we use the JSP packages to deploy the web application. The system contains almost all features of an E commerce site. The web interface is made using html, css and JS.

In the backend two primary divisions exist as JSP packages. One for the admin and another for the users. The admin will have access to edit everything in the site. The admin can change item inventory and add new items to the site if required. All the functions in the backend will exist as JSP packages.

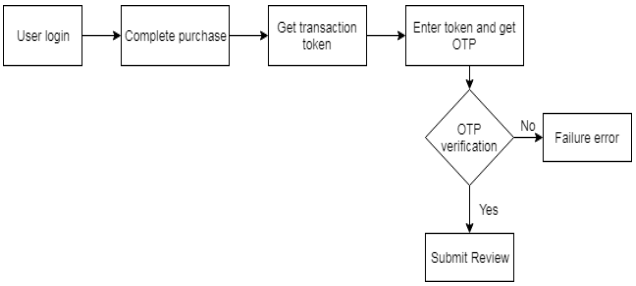
4.MODULAR DESCRIPTION

4.1 Verification

Once the product is purchased by the user, they are eligible to submit their review. To make sure this step is secure. A transaction id will only be generated after a successful purchase by the user. Also before posting a review for this purchase. The user must go through another process.

They must enter the transaction id which was generated during their purchase. Once this is entered a One Time Password will be sent to their email. They must then use this to verify themselves. After this process. Their review will be successfully posted.

By doing this process, we can stop the people who post reviews without purchasing a product in the first place. Now almost all the reviews are trusted because only the people who really purchased the product are posting the reviews.



The last part of the system is the cluster formation part. Here, the users are grouped based on their interest. Then, further recommendations are notified to the customers in the group.

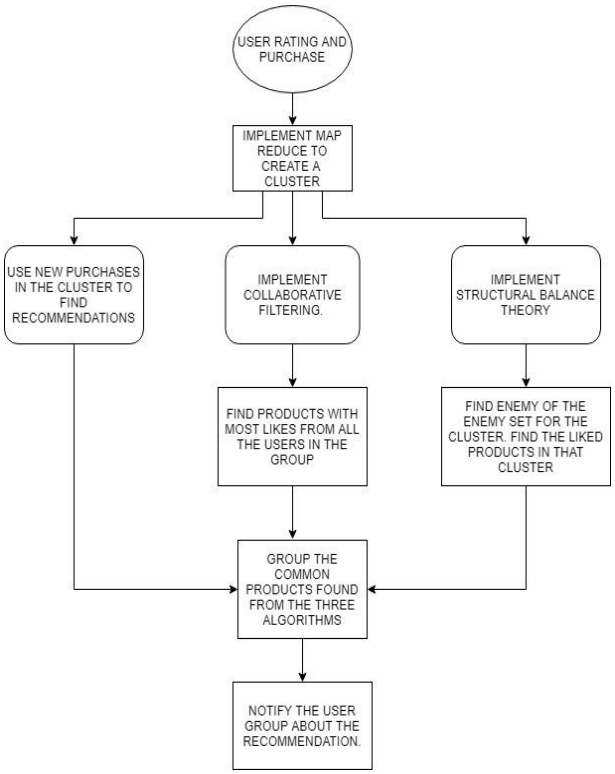
4.2 Recommendation

- The first process, is to cluster a user group based on the purchase. That is, a product which is purchased by several users and clustered together. Here we will use a product id, and the customers who have the product id in their purchase history will hence be in the same cluster.
- Next is to get recommendations based on new purchases in the cluster group. That is, if a customer in a cluster purchases a new product this can be taken as a recommendation.
- In order to improve prediction, we use collaborative filtering. This algorithm works by filtering products based on the likes given by the user. In this case, we can use a wish list as an interest to the customer. So, the product which is present in most of the customer's wish list in a cluster will be recommended.
- The last process involves the Structural balance theory algorithm. As seen in Literature survey 1, this process requires the opposite of the opposite cluster for a selected cluster. This in simple words uses "Enemy of my enemy is my friend" concept, thus there could be potential and unique products which could be recommended to the user.

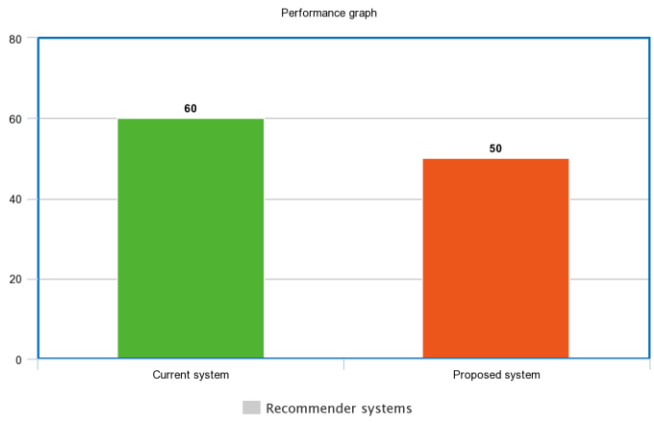
For example, In the smartphone category, users buying iphone will be grouped together. Then users buying other brands will be grouped together as well. Then the opposite of their set is found, that is the customers who submitted

negative review for their purchases. Then the algorithm will be applied to find unique recommendations for the user.

- Once all the three processes gets over. We could then find the common products found by the three algorithms and group them. This could later be used as recommendations to a customer for a ecommerce site.



5.PERFORMANCE ANALYSIS



The performance is maximum when using only the purchase history. But most recommendations in this approach are irrelevant to a user.

The proposed system implements three algorithms to filter the recommendations for the user. Therefore, it must calculate a like cluster and also a dislike cluster so this affects the performance to a slight extent. The like cluster group would be used in the collaborative filtering part anyways, so this can be used in the final algorithm.

There is also the filtering step where the outputs of the three process can be checked among each other. Here certain conditions could be set and certain exceptions could also be made. Because if all the outcomes of the three process should be matched, then we could not spot certain unique recommendations.

6. CONCLUSIONS

The system uses the OTP verification step during the review submission process. This ensures that the submitted review is done by the real customer. This stops the several thousand fake reviews being uploaded for a product.

The system uses the structural balance algorithm to suggest unique product recommendations to the customers. This could recommend new products which could be new and relevant product for a customer.

The recommendations found in this system could enhance the purchase decision for the customers by suggesting new products. But this system has scope to improve by adding several different approaches to filter the recommendations much better. Also, this system instead of being for a specific ecommerce site, can also exist as a stand-alone system, which could get input from several different sites and recommend products to a customer with multiple platform choices.

REFERENCES

[1] Qi, L., Xu, X., Zhang, X., Dou, W., Hu, C., Zhou, Y., & Yu, J. (2016). Structural Balance Theory-based E-commerce Recommendation over Big Rating Data. IEEE Transactions on Big Data, 1–1.doi:10.1109/tbdata.2016.2602849.

Liu, J., Jiang, Y., Li, Z., Zhang, X., & Lu, H. (2016). Domain-Sensitive Recommendation with User-Item Subgroup Analysis. IEEE Transactions on Knowledge and Data Engineering, 28(4), 939–950.doi:10.1109/tkde.2015.2492540R. Nicole, "Title of paper with only first word capitalized," J. Name Stand. Abbrev., in press.

Cai, Y., Leung, H., Li, Q., Tang, J., & Li, J. (2010). TyCo: Towards Typicality-based Collaborative Filtering Recommendation. 2010 22nd IEEE International Conference on Tools with Artificial Intelligence.doi:10.1109/ictai.2010.89.

Hernandez, S., Alvarez, P., Fabra, J., & Ezpeleta, J. (2017). Analysis of Users' Behavior in Structured e-Commerce

Websites. IEEE Access, 5, 11941–11958. doi:10.1109/access.2017.2707600.

Lei, X., Qian, X., & Zhao, G. (2016). *Rating Prediction Based on Social Sentiment From Textual Reviews. IEEE Transactions on Multimedia,18(9),1910–1921.*doi:10.1109/tmm.2016.2575738.

Shaikh, S., Rathi, S., & Janrao, P. (2017). *Recommendation System in E-Commerce Websites: A Graph Based Approached. 2017 IEEE 7th International Advance Computing Conference (IACC).*doi:10.1109/iacc.2017.0189.