PRODUCT RECOMMENDATION USING EMERGING TECHNOLOGIES

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Abstract

Ecommerce websites have fully changed traditional shopping patterns from offline to online. Furthermore, the uptrend in purchasing has helped them keep track of their customers/clients, their choices, and their interests. With the help of customized recommender software, they were able to suggest some products which the customer might be interested in. The recommender systems aim to propose the right products to the customers. Currently, there are few recommender systems in markets which are focusing on customer reviews, ratings, and purchases and then suggest appropriate items and their accessories to customers. Few recommender systems also focus on the frequency of the products viewed and their demographic data. This paper studies the comparison among various existing recommender systems and suggests a more appropriate way of building a recommender system.

Keywords: Recommender systems, Ecommerce, Collaborative Filtering, Ratings, Reviews, Demographic data.

I. INTRODUCTION

Recommender systems are programs that attempt to predict the right product to the customers based on their interests and some given information in their profile. Most existing product recommender systems use the major approaches that include collaborative filtering methods, content-based approaches, and hybrid filtering methods are a combination of both approaches to recommend the right product to the customers. Collaborative filtering is used to recommend products based on the user/customer preferences by comparing their history of selections with the other customers' similar selections. By contrast, the content-based approach use item information for the recommendation. Collaborative filtering is effective as it overcomes many shortcomings of content-based recommending systems. This is because of the collection of the historical ratings of m users on different products.

As the use of only the items that are purchased and ratings on products is not enough and attributes like views, demographic data, subject interests, and favorites. At Amazon.com, the use of recommendation algorithms to provide a personalized store for every customer is done to improve the experience. Recommending systems also use demographic factors---sex, working status, age, income, marital status, etc. and results indicate that the change of demographics affects the recommendations of the right product. Developing recommending systems on microbloggi1ng service helps in gathering customer data from various social platforms or public profiles that include customer age, gender, professions, and extract demographic characteristics.

This paper compares different recommendation systems and their approaches to predict the right product to the customers. It also tries to suggest a better or more relevant approach to recommend a product.

II. LITERATURE SURVEY

Table 1: Survey on different approaches

Paper	Method	Advantages	Disadvantages
E-commerce recommendation Opportunity model: Right product; correct time. **AUTHORS:** Y.Zang and J. Wang	Wang Based Promotion Zhang Push.	• Problem solving that suggests products based on time to fix. • Effective stimation	• The decision is made it off without market preference.
Prediction of retail sales and item suggestions using store-level consumer demographics. **AUTHORS:** M. Giering	Giering Inborn-baseline Methodologie.	• High performance. And precision.	• With low usability, response time is improved.
Recommendations from Amazon.com: collaborative filtering Item-to-item. **AUTHORS:** G. Linden, B. Smith, and J. York	Collaborative on Filtering.	• Personalized client shopping experiences. • Elevated optimization /scalability.	• Elevated cost of service. • Poor quality.

The new demographics and polarization of the market. **AUTHORS:** V. A. Zeithaml	Fragmentation.	• Descriptive Analysis and nonparametric on all variables was used by various populations of shoppers.	• Needed to have more parameters considered.
Demographic-based microblog recommendation framework for products. **AUTHORS:** W. X. Zhao, Y. Guo, Y. He, H. Jiang, Y. Wu, and X. Li	Microblogs.	• Detect users from their microblogs to buy intentions. • Viability in matching the personal data of users gathered from the media.	• Elevated cost of service.
Recommender list focused on feedback of consumer goods. **AUTHORS:** Silvana Aciar, Debbie Zhang, John Debenham, Simeon Simoff.	Conduct of customer exchange.	• Improving the recommendation's efficacy using experience of consumers.	• Elevated cost of service.
A case study focused on Purchase Data in a Recommender Framework. **AUTHORS:** Bruno Pradel, Savaneary Sean, Julien Delporte, Nicolas Usunier.	Filtering Collaboratively.	• Shortest optimization based on best output rules. • Well-performing algorithms.	• High information Sparity problem.
We suggest: A product review-based recommendation framework. **AUTHORS: Malony Alphonso, Vedita Velingker.**	Mining Belief, Excavation of knowledge.	• Enhancing the recommendation's efficacy. • Decision making.	• Elevated cost of service.

Table 1 shows the Literature survey that concentrates on obtaining the comparisons among different recommendation systems about their implementations, methodologies, advantages, and disadvantages. This helps in understanding the approaches that can be improved for future implementations on different applications.

III. APPLICATIONS

This table aims is to acquire the uses of real-time applications in various fields based on the type of recommendation system used. This also focuses on getting the number of profits an application is gaining with the implementation of a particular recommendation approach.

Table 2: Recommendation system usage in different applications

Application	Algorithm	Profits	Recommendation System
Amazon.	Collaborative filtering based on objects.	• 35 percent of the income collected byAmazon.com is generated by its recommendation engine.	• It sights recommendations and pairs them with similar items from the purchased or rated items of the user, using metrics and writing a list of suggestions.
Flipkart.	Learning by machines (Decision trees, logistic regression, deep learning).	• INR 30,931 Cr, a 43 percent Y-o-Y rise, was the company's revenue for the year..	• In its model, it uses point-wise logistic regression that can predict the login rate and brand conversion and rank them according to their optimization function.
YouTube.	A feedback loop in real time.	• On any and all video clicking from the main page, suggestions account for more than 60 percent income.	• Google Brain, which was recently opened up as Tensorflow, powersYoutube recommendations. By doing this, one could use decentralized training to explore on various deep neural network framework.
Instagram.	Big Three.	• An estimated $6.84 billion US in revenue earned by Instagram	• Instagram Explore is a recommendation engine used, which along with the aid of new technologies such as ai and machine learning, recommend a most valuable content to users in real time.
Ebay.	The finest match.	• Its annual net sales amounted to over $10.8 billion in its most recently reported year.	• Graph-based eBay recommending systems..
Netflix.	Learning by machines.	• $1 billion annually, and combined suggestion and customization impact save about $1 billion annually.	• It uses the personalized method where movies are suggested to the users who are most likely to enjoy them based on a metric like major actors or genre.

The above Table explains how the different applications make use of a recommendation system.

IV. SURVEY ON PRODUCT RECOMMENDATION SYSTEM

To get a better understanding of the basic choices from which people/customers want to receive recommendations, a survey was conducted. This survey is done by passing a google form to different groups irrespective of their demographics and obtained opinions about their choice of recommendations. The following figures (Table3, Table4, Table5) show the survey results in terms of percentage as per the questions asked. This also helps in showing the opinions among different demographic people on how they want to get the recommendations based on their interests.

Table 3: Survey results 1 in terms of percentage

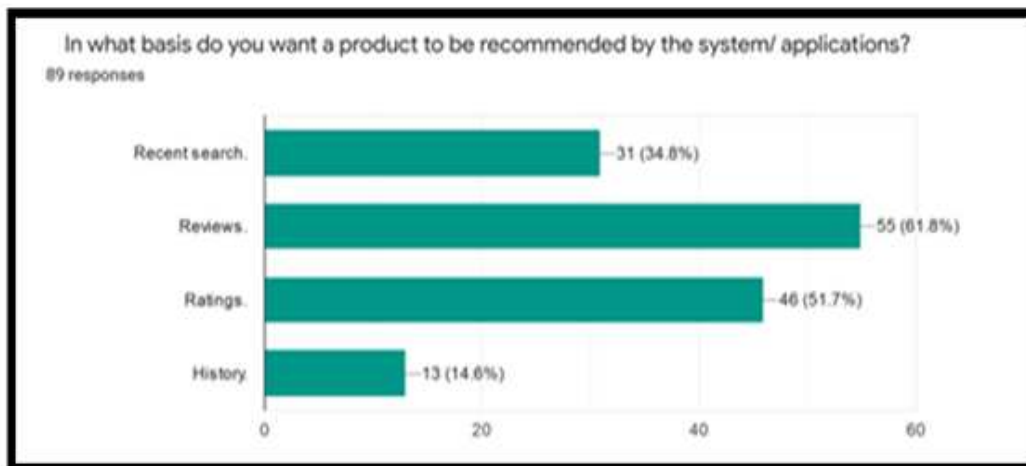| Sl. no.	1. In what basis do you want a product to be recommended by the system/applications?	GENDER (F/ M)	AGE
1. Recent Search.	33.8%	15% F and 7% M	(10 – 15) 20% (16 – 24) 08%
2. Reviews.	64.6%	60%F and 40%M	(16 – 24) 70% (36 – 45) 30%
3.Ratings	55.4%	50%F and 50%M	(16 – 24) 70% (10 – 15) 10% (36 – 45) 20%
4.History	16.9%	10%F and 10%M	(16 – 24) 10%

Figure 1: Graphical Representation of Table 3.

Table 4: Survey results 2 in terms of percentage

SL. NO.	2. How do you recommend the items on the various websites?	GENDER (F/M)	AGE
1. Cost effective	53.8%	50% F and 50% M	(10 – 15) 20% (16 – 24) 18% (36 – 45) 10% (25 – 35) 30%

2. Quality.	76.9%	50%F and 50%M	(10 – 15) 10% (16 – 24) 50% (25 – 35) 40%
3. Ratings.	30%	40%F and 60%M	(16 – 24) 70%
Reviews.	38.5%	10%F and 20%M	(16 – 24) 20%

Table 5: Survey results 3 in terms of percentage

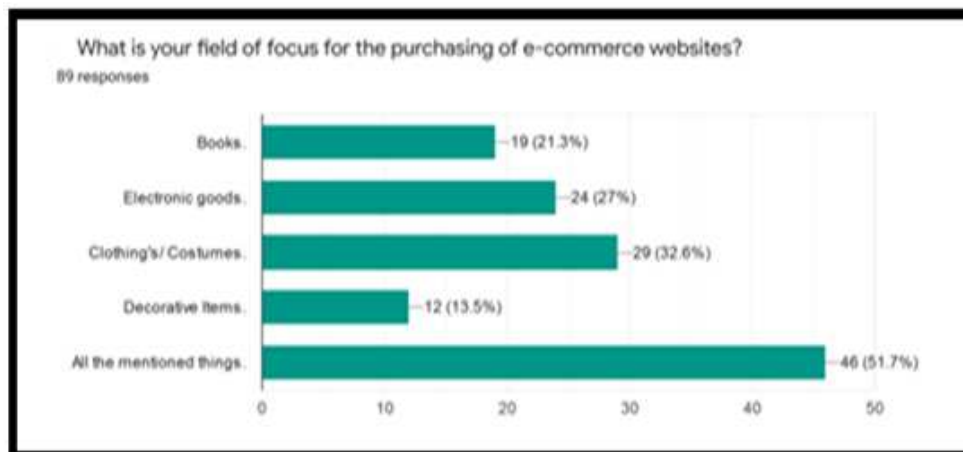| Sl. no.	3. What is your field of focus for the purchasing of e-commerce website products?	GENDER (F/M)	AGE
1.Books.	20%	13% F and 7% M	(10 – 15) 20% (16 – 24) 8%
2.Clotings/ Costumes.	29.2%	50%F and 50%M	(16 – 24) 50% (36 – 45) 40%
3.Electronic goods.	33.8%	40%F and 60%M	(16 – 24)70%
4.Decorative items.	15.4%	10%F	(16 – 24) 10%

Figure 2: Graphical Representation of Table 5.

This survey helped us to get to know about the preferences among possible demographic groups. The changing demographics may lead to a change in preferences and recommendations has to be changed accordingly. From the survey, we observed that almost 70% to 80% of people have opted that they need cost-effective product recommendations and they also compare their products with other applications.

We find most people irrespective of their age, gender and other demographics have shown interest in various areas such as books, clothing, electronic goods, decorative items, etc. and this makes for any recommendation systems to make sure they provide the right product based on their preference. For this, there is a need for tracking customer activities to know them well.

Ratings and Reviews are another most opted options where customers like to buy products based on the ratings and reviews provided by other customers with the experience. This helps any customer to trust the product, buy, and also recommend it in turn to others.

By this survey, we can say that any recommendation system must be able to track the user preference no matter what their demographic data might be and provide the right product as the recommendation to increase their satisfaction and keep updating the system based on the changing demographics and preference.

V. CONCLUSION

A good recommending system is required to improve the customers' experience by recommending the right product during their purchase, and also at the time of their visit to the site. With the changing demographics information, there is a need to update the recommendations. Consumer reviews, opinions and their experiences in the use of a product is the best source to get the information regarding the preferences of consumer in recommender systems.

This paper has focused on addressing a comparison of product recommendation systems in various fields and applications. The Survey is done to obtain opinions from people on different demographics. By the comparison and survey, we found that customers have varying opinions about the factors through which they want to receive the right recommendations. The approaches such as collaborative filtering and clustering algorithm are found to be used in most of the recommending systems and can be chosen to produce the right system that recommends the appropriate product to the customers.

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