Collaborative Filtering Based Recommender Systems For Marketplace Applications

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Abstract.
The background of this research is to give the best advice to users who still don't know about other marketplaces that they can still use, to find the items they are looking for and at a cheaper price or with promos they can get. The method used in this research is to use a trial based on data obtained from users who use the media marketplace to purchase an item, with this, the real data can be known so that the best advice for an unknown marketplace can be given. In how many countries, a recommender system has been implemented in a marketplace that will provide advice using advertising media on social media, by using social media, users can find out about the marketplace, and are given continuous advice to install the application so that they can make transactions with purchase of a product in the marketplace. The purpose of this research is to give the best advice so that all people, especially marketplace users, can find out which other marketplaces are in order to know and be able to shop at other marketplaces, by doing price comparisons and being able to get promo prices and knowing based on habits, and ratings from the marketplace.

Keywords: *Collaborative Filtering, Recommender System, Marketplace, Applications.*

I. INTRODUCTION

With the advice given to customers so they can find out about other marketplaces so they can make comparisons between one marketplace and another, the benefits that customers get are that they can find out what goods are in other marketplaces at lower prices and can get existing discounts or promos, every time. The marketplace has its own advantages and disadvantages, therefore by knowing the many marketplaces you will be able to find the item you are looking for at an affordable price [1].Many marketplaces carry out promotions using well-known domestic and foreign artists to boost sales in their marketplace, but it cannot be denied that the costs are very expensive and cannot be done for a long time, with these limited costs, a recommender system using a collaborative filter will provide the best advice in the marketplace [2].The problem raised in this study is how to provide the best advice for customers so that they can shop in several marketplaces with the same or cheaper prices, with the best advice, they will be able to increase sales of a marketplace and be able to find out the prices of goods in several other marketplaces [3].The method used in this research is to use a literature review and perform calculations in order to provide the best advice for customers who often make transactions in the marketplace, with a literature review, they will find the latest research problems, and can contribute to the latest research [4].The purpose of this study is to provide the best advice for customers who often buy goods through the marketplace, with the best advice being able to direct the purchase of goods and the same price in several existing marketplaces [5].

This journal is about the business strategy of B2B e-commerce in order to compete with B2C e-commerce because in practice consumer satisfaction with B2B is lower than B2C which shows that companies in the B2B market do not understand their customers deeply and make inefficient responses to needs. Their needs. We implement a recommendation system for B2B e-commerce, hopefully it can focus

both on the needs of consumers and suppliers, contribute to streamlining business transaction processes, better customer relationships, improve customer satisfaction, and make business dealers understand each other better. In addition, we consider the recommendation system to B2B e-commerce to be connected with the back-end enterprise information system and contribute to the company's marketing professionals. We believe that this application of the recommendation system in B2B e-commerce is a new and promising area of research. Content-based filtering (CBF) uses descriptions of items that customers have previously watched or purchased and rated positively. The system recommends consumers items that are similar to the items they entered in the past. Collaborative screening (CF) is the most mature and most widely used recommendation system. It only relies on opinions explicitly expressed by the user on the item. The system recommends to the targeted customer products (or people), which have been evaluated in pluses by others, whose ratings are similar to the ratings of the targeted users.

This means that similar tendencies like hobbies, interests, interests, etc. The hybrid approach to recommendation systems combines content-based and collaborative filtering [6]. This application considers resource heterogeneity, user interest and mobility to intelligently leverage the vast, rich and shared web resources and services available on the Web. This system tries to identify the characteristics of active users and then provides suggestions based on users' personal past history or on the basis of opinions of friends, relatives and associates etc. to facilitate their decision. To compare the relative performance of Memetic and Genetic Algorithm, a model-based collaborative filtering recommendation system was developed respectively. User-based clustering models were constructed using pluck and genetic clustering algorithms for each collaborative screening system [7]. Recent research has begun to examine the vulnerabilities of different recommendation techniques, such as collaborative filtering, in the face of so-called “shilling” attacks. We use the more descriptive phrase "profile injection attack", because promoting a specific product is only one way such an attack can be used. In a profile injection attack, an attacker interacts with a collaborative recommendation system to build within it a number of profiles associated with a fictitious identity with the aim of biasing system output. Types of Attacks a profile injection attack against a collaborative recommendation system consists of a number of attack profiles added to a database of real user profiles.

The purpose of a push attack is to increase the system's predictive rating on the target item for a specific user (or group of users). An attack type is an approach to building an attack profile, based on knowledge of the recommender system, its rating database, the product, and/or its users. The general form of an attack profile is depicted in Figure 1. The specific attack type determines the method for assigning a rank to the fill item set and the target item [8]. In recent years, more and more variety of content is available on the mobile Web environment, with the mobile device music market witnessing very rapid growth. However, customers still experience a lot of frustration when searching for the music they want on mobile Web devices, due to the inefficiency of sequential searches. When a customer uses a mobile phone to log in to a site to download music, the site presents a list of the best-selling or latest available music. The customer page goes through the list and selects an item for review [9]. E-Commerce is the use of computer networks to conduct business communications and commercial transactions. Then on the E-Commerce Net website, E-Commerce is defined as the activity of selling merchandise or services over the internet. All components involved in practical business are applied. All components involved in practical business are applied here. Such as available products, payment methods, guarantees for products sold, promotion methods, and so on, such as customer service, available products, payment methods, guarantees for products sold, promotion methods and so on. All definitions described above basically have similarities which include the transaction components of the subject and object involved as well as the media used [10]. The recommendation system is an application model based on observations of the customer's circumstances and desires. Therefore, the recommendation system requires the right recommendation model so that what is recommended is in accordance with the customer's wishes, and makes it easier for customers to make the right decisions in determining the product to be used. The recommendation system is a personalization tool that provides users with an information list of items according to the wishes of each user.

The recommendation system will offer the possibility of filtering personal information so that only information that matches the needs and preferences of users will be displayed in the system using a recommendation technique or model [11]. The library recommendation system is an application model based on observations of library members regarding their circumstances and desires. The Recommendation System utilizes the opinions of library members when searching for books with certain categories, to assist members in choosing books. So that the search recommendation system requires an appropriate recommendation model so that what is recommended is in accordance with the wishes of members and makes it easier for users to search for the right book and determine which book to choose [12]. With the ever-evolving field of machine learning and major changes in the storage and use of information around us, recommender systems are starting to have an important and important role to play, which can be seen as a necessity for both, e-business. Retailers and their following customers. Careful recommendations are made by taking other documents similar to those previously liked by the user. On the other hand, collaborative filtering works on the assumption that users with similar tastes and preferences will experience similar things [13]. Recommendation system is software, which is used to recommend items of interest to users. By design, a recommendation system is a personalized system for users. Design is an intermediary stage to map the specifications or application requirements to be built. The recommender system is useful for providing product recommendations to be selected based on past preferences, purchase history, and demographic information. In general, the recommendation system is very useful for users who have not or lack of experience and lack of knowledge in choosing many alternatives and for evaluating alternatives, which are more relevant than others. The reasons for choosing a recommendation system from a business point of view, namely to increase sales, sell more diverse goods, increase user satisfaction, increase user loyalty, better understand user needs [14].

II. RESEARCH METHOD

The first method carried out in this study uses a literature review by reading 100 journals and 30 books related to this research, so that it can find out research problems that can be raised which are the latest research problems, therefore research novelty can be raised so that it can help research and can be used as a basis for future research.Research problems are found after conducting a literature review, based on previous research problems, and finding the latest research problems so that they can raise existing research problems.By conducting research so that data processing can be done properly so that it can produce answers to the problems raised in this study. The final stage is to provide the best suggestions for other marketplaces than usual so that you can find the same item at a different price or promo.

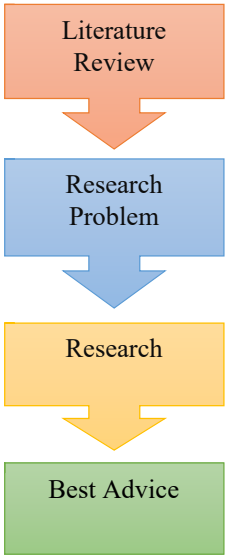

Fig 1. Research method

III. MODEL PROPOSED

Based on Figure 2 below, the following explanation can be given, the model offered in this study, the image and explanation there are users who use the marketplace and stored in the customer database, then the data is processed based on habits and ratings, so that it is known the pattern of the marketplace that is often used then the data is processed in classification so that it can provide the best advice for other marketplaces so that they can be used and find out products, prices and promotions in other marketplaces.

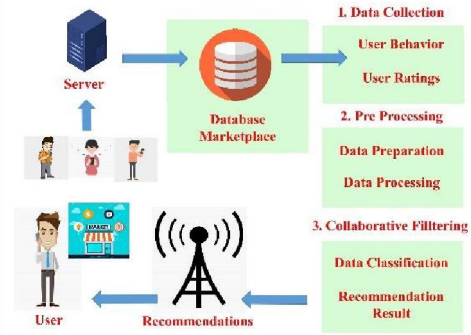

Fig 2. Model framework collaborating filters

Based on Figure 3 below, it will be explained as follows, Figure 3 illustrates the user marketplace model, in this image it is known that users often use which marketplace, if it is known, it will be suggested that other marketplaces have the same goods and different promos, so that customers you can choose which marketplace is the best to shop for the items you are looking for.

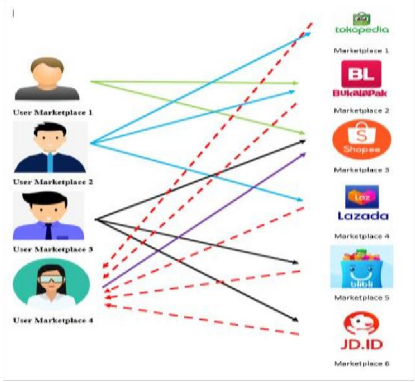

Fig 3. Model user collaborating filters

Based on table 1 below, it will be explained as follows, there are 4 points to assess the rating and the habit of opening a marketplace, the first point has the meaning of being unattractive, the second point has a normal meaning, the third point has the meaning of being liked, and the fourth point has the meaning highly favored by users of the marketplace.

Table 1. Descriptions Marketplace

Point	Description
1	Not Attractive
2	Ordinary
3	Like
4	Very like

Based on table 2 below, it can be explained as follows, there is a table containing four marketplace users by providing 4 answers from the usual to the most preferred, so that from the four marketplace users the highest and lowest values can be known to give the best advice first.

Table 2. Behavior Marketplace With Missing Values

	B1	B2	B3	B4	B5	B6
U1	3	1	2	4		
U2	4		3	2	1	
U3		1	4	3	2	

U4	1		3		4	2
T	8	2	12	9	7	2

U = User, B = Behaviors Marketplace, T = Total

Based on table 3 below, it can be concluded that this table is a table of ratings for a marketplace. With this, it can be seen which user likes a market price the most. With several matrices that exist with the existence of creatures, it can be seen with the highest rating that is often used for transactions by customers.

Table 3. Ratings Marketplace With Missing Values

	M1	**M2**	**M3**	**M4**	**M5**	**M6**
U1	1	2		4	3	
U2	3	1	4		2	
U3	3	2		1		4
U4	4	2		1	3	
T	11	7	4	6	8	4

U = User, B = Ratings Marketplace, T = Total

Based on figure 4 below, it can be explained that there are the highest and lowest numbers based on customer habits in shopping, in the highest and lowest values it can be ascertained that the advice given first is with the highest value then below the highest value and so on up to a certain value. Low, therefore this table is a table that refers as a basis for suggestions to customers based on shopping habits in the marketplace.

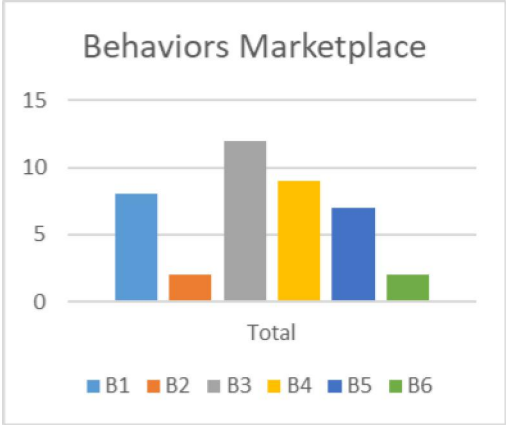

Fig 4. Table of values from the behaviors of marketplace customers

Based on figure 5 below, it can be explained that there are the highest and lowest numbers based on customer ratings in shopping, in the highest and lowest values it can be ascertained that the advice given first is with the highest value and then below the highest value and so on up to a certain value low, therefore this table is a table that refers as a basis for suggestions to customers based on shopping ratings in the marketplace.

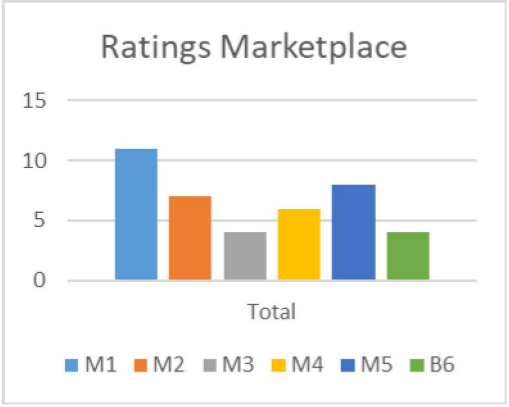

Fig 5. Table of values from marketplace customer ratings

IV. TESTING ON CUSTOMERS

Based on the table 4 below which shows the results of trials conducted on marketplace customers based on their shopping habits in a marketplace, it can be concluded that Tokopedia has a value of 11, Bukalapak 10, blibli 9, shopee 6, Lazada 4, JD.ID 0, Tokopedia has the highest score, which is the first suggestion that the system will give to users in order to open access to the marketplace.

Table 4. Behavior Marketplace

	Tokopedia	Bukalapak	Shopee	Lazada	Blibli	JD.ID
James	4	4	3		2	
Frans	3	3		4	4	
Marco	4		3			
Adam		3			2	
Total	11	10	6	4	9	0

Based on the table 5 below which shows the results of the trials conducted on the customer marketplace based on the ratings of a marketplace, it can be concluded that Shopee has a value of 11, Tokopedia has a value of 10, JD.ID has a value of 8, Blibli has a value of 6, Lazada has a value of 4, Shopee has a value of 3, the highest score is owned by Shopee which is the first suggestion that they can open access to the marketplace.

Table 5. Ratings Marketplace

	Tokopedia	Bukalapak	Shopee	Lazada	Blibli	JD.ID
James	3		4		3	4
Frans			3			
Marco	4			4		4
Adam	3	3	4		3	
Total	10	3	11	4	6	8

Below is the figure 6 that will be given to the customer based on the highest value and the lowest value, with this value it will be known which one will be suggested at the beginning and then until the end in the marketplace behaviors table has a value, namely Tokopedia has a value of 11, Bukalapak has a value of 10, Blibli has a value of 9, Shopee has a value of 6, Lazada has a value of 4, JD.ID has a value of 0, Therefore, the first suggestions and so on are Tokopedia, Bukalapak, Blibl, Shopee, Lazada, and JD.ID.

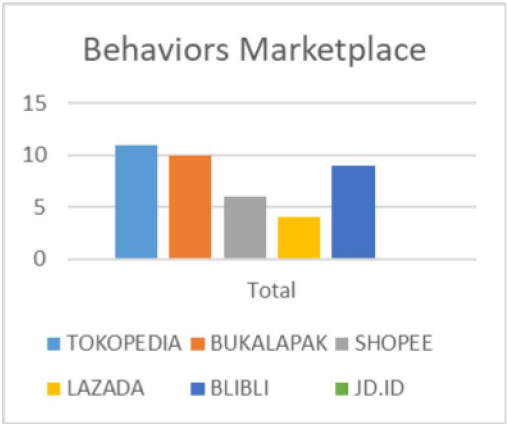

Fig 6. Recommended marketplace table based on behaviors

Below is the figure 7 that will be given to the customer based on the highest value and the lowest value, with this value it will be known which one will be suggested at the beginning and then until the end in the marketplace Ratings table the value is Shopee has a value of 11, Tokopedia has a value of 10, JD.ID has a value of 8, Blibli has a value of 6, Lazada has a value of 4, Bukalapak has a value of 3, Therefore, the first suggestions and so on are Shopee, Tokpedia, JD.ID, Blibli, Lazada, Bukalapak.

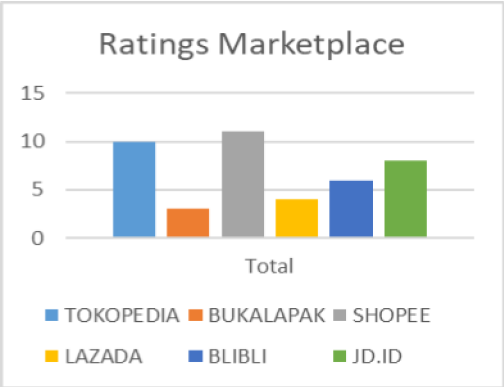

Fig 6. Recommended marketplace table based on ratings

V. CONCLUTION

Based on the conclusions above, it can be seen that the user's habits in a marketplace can be known based on the data obtained from the user's frequent use of a marketplace. Prices are much cheaper, as for suggestions based on habits the first is Tokopedia, the second is Bukalapak, the third is blibli, the fourth is shopee, the fifth is Lazada and the sixth is JD.ID. Based on the rating given by the user on a marketplace, it will be suggested that the first marketplace is Shopee, the second is Tokopedia, the third is JD.ID, the fourth is Blibli, the fifth is Lazada, the sixth is Bukalapak, with this data above, users who have not used one of the marketplaces above will be advised based on the habits and ratings they provide.

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