

Influences and Solutions of the Cocoon Room Caused by the Intelligent Recommendation Algorithm of the E-commerce Platform

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Abstract: With the Internet and logistics transportation developing rapidly and the popularization of devices like smartphones, online shopping has become an ordinary issue for each of us. No matter what product is needed, such as a refrigerator or just a spoon, could be available as long as we search in the website or application of the e-commerce platform, fill out an address and then pay for the product. While browsing in the e-commerce platform for the goods wanted, it is just as though we are in a large market which involves kinds of products. Consumers need to find what they want. The retailers and the e-commerce platform also need to reach for more potential customers and get more orders more efficiently. This is the reason for the adoption of recommendation algorithms. Although recommendation algorithms have somewhat achieved these in practice, there are still a few problems. This paper mainly described the application status of the intelligent recommendation algorithm of the E-commerce platform and how the cocoon room came into being in such a situation. Then there was an analysis of the cocoon room of the intelligent recommendation algorithm, making consumers feel bored or regret after purchasing and consequently harming the interests of the retailers and the platform itself. Subsequently, solutions to the two kinds of negative moods were proposed. The last is the summary, meaning in practice, and extended study direction of this analysis.

Keywords: E-commerce Platform, Recommendation Algorithm, Cocoon Room, Negative Moods

1. Introduction

Recently, with the development of technology and the widespread of the Internet, people live in a society where changes happen every day and everywhere. There is no doubt that e-commerce is not a new word anymore and takes a significant part in our daily lives. Due to this, here comes a market that is deep and broad enough to make a crowd of retailers and e-commerce platforms try their best to draw benefits from it. In order to attract more consumers and gain their purchasing and loyalty, a platform would adopt an intelligent recommendation algorithm to serve each customer or potential customer with product information selected for his or her preference. So the products recommended would meet the needs of the consumer and thus make them pleased, then willing to buy things and use such a platform more frequently than its competitors.

However, existing intelligent algorithms are not capable of understanding all of the consumers' thoughts. In fact, algorithms are just running by recommending goods of similar features or bought by similar people for now, which gives a consumer crowded and similar information, thus is prone to get him or her into a cocoon room [1, 2].

2. The Application Status of the Intelligent Recommendation Algorithm

According to previous research, there are two main models of recommender algorithms: one is the content-based similarity model, and the other is collaborative filtering.

2.1. Content-Based Similarity Model

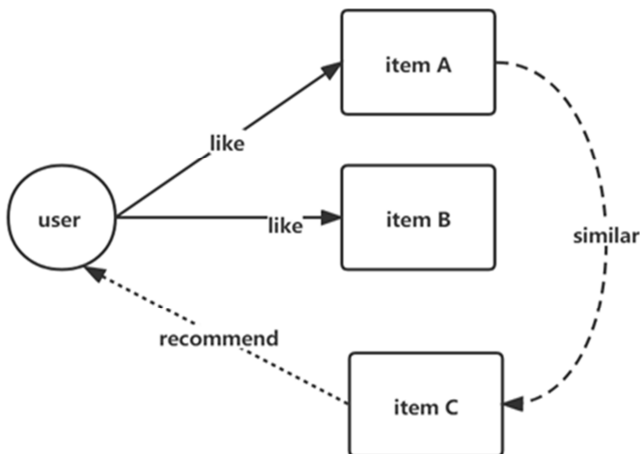


Figure 1. Content-based Similarity Model.

The content-based similarity model means portraying a user on the basis of contents of goods which he/she has searched, clicked through, or bought before, and recommend him or her something similar to them. That means this method assumes that a user would like products that are similar to the ones he

or she used to like before. When the method is applied, a few attributes will be extracted from each product, then users' interactions with various products will be recorded and analyzed to extract their preferences for specific attributes, which shall form the users' preference portraits. After this, we can extract attributes from the candidate goods, then sort the attributes referring to the preference portraits, and take the first few products to recommend to users. Here is Figure 1 to show the method [3].

2.2. Collaborative Filtering

Collaborative filtering means to group similar users or products through logs of users' preferences which they have created by their interactions with various products, in other words, to recommend on the basis of the similarity of users or products. Collaborative filtering includes two ways: one is based on similar users, and another is based on similar products.

Collaborative filtering based on similar users is finding users who have similar interests, preferences or behaviours with the consumer, then taking the goods they have viewed, searched or purchased to recommend to the consumer. Here is Figure 2 to show the method.

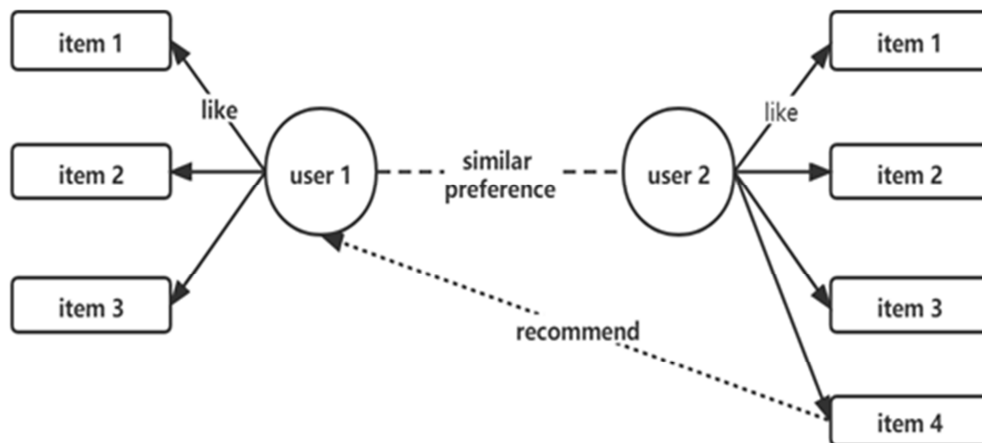


Figure 2. Collaborative Filtering Based on Similar Users.

Collaborative filtering based on similar products means if there are two or more goods that are welcomed by many users at the same time, we assume these goods as similar items. As long as a consumer likes one of the similar goods, the others might be preferred by the consumer as well. Here is Picture 3 to show the method [3].

Besides, there are some mixed types of recommendation approaches, which mean to combine different models of content-based similarity algorithms with ones of collaborative filtering. Such as: (a) Applying content-based similarity algorithms and collaborative filters separately, then mix the outcomes for recommending [4]. (b) Applying collaborative filtering with some characteristics and methods of content-based similarity [5]. (c) Applying content-based similarity approach with some characteristics and methods of collaborative filtering [6]. (d) Integrating the advantages of both approaches, and

making it a new recommendation algorithm [7].

Models mentioned above are all relying on similarities to select and recommend products to viewers. Because of this, users will receive continuous product recommendations that bear similar or even identical features. As the information cocoon room theory illustrates, the quantity of similar recommending information will build a cocoon room for the receivers and cut the chances of theirs getting in touch with different things or news. However, a consumer's need for certain products is not limitless during a period of time, which means the overflowing of similar products recommended sometimes would not promote purchases. Even worse, the burden of comparing and price calculating would refrain consumers from impulsive purchasing. When the purchase of any product is made, then recommending the similar products usually becomes in vain.

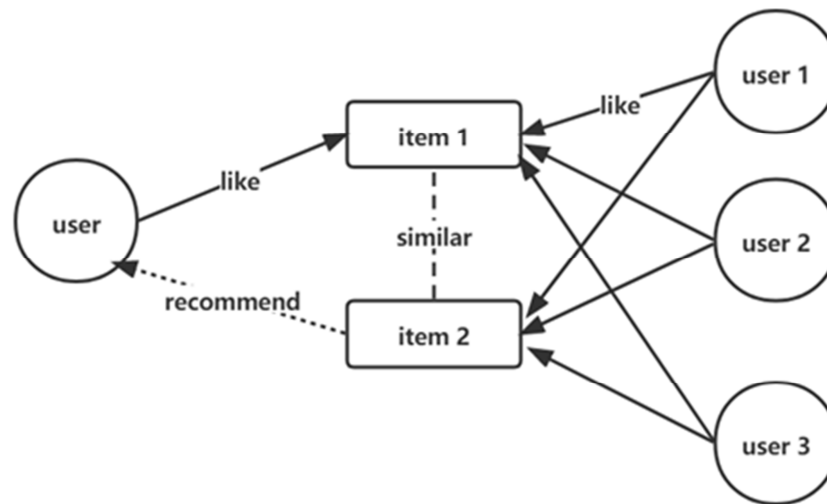


Figure 3. Collaborative filtering based on similar products.

3. Analysis on the Cocoon Room of the Intelligent Recommendation Algorithm's Influence on Consumers

3.1. The Cocoon Room of the Intelligent Recommendation Algorithm Brings Consumers Boredom

According to previous research studying why consumers will feel bored, marginal utility theory and optimal stimulation level theory are usually used to explain such a phenomenon [8].

Marginal utility is the subjective valuation of individuals that comes from extra consumption. And marginal utility theory assumes that an individual's utility is closely related to the stimulations he or she has received. When the stimulations are enough to satisfy the individual's need, more input will lead to a slight increase in the received utility or even damage the satisfaction. Optimal stimulation level means the internal and external stimulation that an individual prefers to receive in all the possible situations during a period of time. It is mentioned in the optimal stimulation level theory that when the stimulations provided by the environment are lower to the optimal level, the individual will feel bored and be more prone to seek diversity and novelty.

The reason why platforms adopt recommendation algorithms is to dig in consumers' needs and wants out and makes a correct match to them with their various goods, which means meeting consumers' needs and gaining benefit for the retailers and the platform at the same time. Nevertheless, consumers are humans whose needs and minds are complicated and changeable and cannot be wholly deduced and predicted what kind of goods they are willing to purchase at this or next moment.

With the constantly delivering quantities of similar or identical product recommendations through big data and intelligent algorithms, the marginal utility of the consumer coming from the recommendation information goes down gradually. Furthermore, when it turns to none, the more similar products are recommended, the lower stimulation the

consumer can get compared to his or her optimal level, which would make consumers annoyed and then feel bored and weary. That is to say, once the marginal utility goes down to zero, the consumer has received enough stimulations, and more stimulations will be quite the opposite, in this case, making the consumer feel bored, and be more likely to seek novelty and diversity, like changing for another platform or giving up online product searching for physical stores.

Although compared to users' actively searching for products, it is convenient for them that the intelligent algorithm offers a set of products to simplify their purchasing process. Customers will perceive that these recommended goods are all selected and manipulated by algorithms behind the screen, making users' perceived control go down and feel themselves to be controlled by the e-commerce platform. With the feelings of being controlled, boredom and weariness, users would possibly take actions like ignoring or resisting product recommendations and have a negative opinion upon the platform.

3.2. The Cocoon Room of the Intelligent Recommendation Algorithm Brings Consumers Regret After Purchase

Regret is a cognition-based negative emotion, which is defined as an adverse emotional reaction caused by people's perceived value gap between 'what is' and 'what might have been' after making a decision. It is shown in previous research that different kinds of feedback information after decision-making will induce different emotions. That means when the individual only perceives the outcome of his or her actual choice but nothing about the outcomes of other options, he or she might just feel disappointed. However, when the consumer knows the outcomes of both the actual choice and the other options that could have been chosen, he or she is more likely to feel regret [9].

As an article by Zeelenberg et al. published in 1998 suggested, people in regret will take themselves for not comprehending what had been done and not making full consideration of making mistakes [10]. Thus, they fell into regret and were eager to turn the tide and get things right or get

another chance. So we can see our consumers as regret haters or avoiders who try their best to keep themselves from regret. Once they feel regret, actions will be adopted to improve the situation. One is that they urge to eliminate the bad influences brought by the previous choice, like changing products or refunding. Another one is that the consumers choose to keep away when the consumers feel they will perceive regret on condition that they make the decision, like giving up retailers and platforms which brought them a bad shopping experience and turning to their competitors [11, 12].

As mentioned above, the intelligent recommendation algorithms adopted by e-commerce platforms are mainly designed in the mode based on the exterior features of products or user portraits. The former one offers users product recommendations selected by referring to the exterior features like colours, styles, or usage of products that this user once had searched for, clicked through, or bought. During online shopping, the consumers cannot directly experience the products, but only make decisions based on the sellers' descriptions [13, 14]. Therefore, if they find some better products that they could have chosen in the recommendations after purchasing, regret will come into being along with other bad influences [15].

Taking Taobao app, an online shopping application popular in China, as an example, when the consumer finishes the process of paying for a product, the screen would show him or her a web page confirming that the payment is complete and some goods recommended shown at the bottom of the webpage. On account of referring to products that have been bought by the consumer, a lot among those recommended are pretty similar or even identical to the purchased product. And suppose some of them are better in certain aspects (like price) than the purchased one [16]. In that case, it is possible to upset the consumer and evoke regret about his or her purchasing, which might lead to product changing or refunding, reducing the willingness of pursuing again, making consumers change the goods or refund, which will increase the sellers' trade cost and cut into their earnings, and even turning to the competitors.

4. Two Solutions to the Negative Moods Brought by the Cocoon Room

4.1. A Solution to the Consumer's Boredom

It is analyzed above that consumers' boredom mostly comes from their feelings that the information delivered to them is manipulated by the algorithms and receiving too much similar or identical recommendations. Therefore, the key to dealing with the consumer's boredom is to solve the two problems.

For the issue of feeling being-controlled, the most direct way is to express less manipulation of the algorithms, or rather, to increase the users' perceived control, which is mainly reflected in the design of algorithms and recommendation interfaces. To enhance the users' perceived control, we can add filter bottoms in the recommendation interface to offer consumers choices of recommended goods' brands, colours,

styles, and others that are now primarily applied in the searching area but not recommending one. Through this, the recommendations can be divided into more specific parts, which makes users think that what they are browsing comes from their manipulation and is more adaptive to their needs, and simplifies consumers' decision-making process to some extent.

For the problem of overloaded similar or identical recommendations, some platforms have already taken actions to refresh their recommendation interfaces with some goods or objects that have little relevance with recommended ones, such as coupons of soft drinks in local beverage shops or a preview of a selling broadcasting room.

4.2. A Solution to the Consumer's Regret After Purchase

The reason for consumers' regret after purchase caused by the cocoon room is that recommendation algorithms now available are mainly based on the principle of similarity. It is mentioned in the former part of this article that consumers' needs for a certain kind of goods during a period of time are limited, and so do their financial resource, or say, budget, is limited as well, and that is why before they decide to buy something, they always spend time and energy to search and select among a large number of goods. However, so far, intelligent algorithms available cannot read and comprehend all consumers' moods, needs and thoughts, then here comes more homogeneous products that the consumer has just paid for, and when he or she finds one that is better in some aspects than his or her purchased one, the regret comes into being.

In order to solve this negative mood, two ideas are proposed. One is to avoid recommending the same kind of products as the bought ones, especially when the payment is just made. So we can exempt the goods that are of too much homogenization from the recommendation interface after payment in case that the consumer takes action to compare and becomes displeased. The other idea is to add product recommendations that are not resemblance but related to the purchased good (s) after payment. The "relation" can be interpreted as the same brand, functional correlation, variety correlation, and so on. For instance, the consumer has bought a dress, and we can recommend her a perfume or a scarf that belongs to the same brand; the consumer has paid for a laptop, recommendations on correlation fittings like keyboards or earphones might be more accepted; the consumer has purchased a wardrobe, then he or she might also be in need of other furniture like dressing mirror.

5. Conclusion

This paper suggested that the cocoon room caused by the recommendation algorithms of e-commerce platforms might bring about consumers' boredom and regret after purchase and proposed ideas to deal with these two negative moods. In order to reduce users' boredom about recommending information, some changes should be adopted in the design of recommendation interfaces and algorithms to increase users' perceived control, such as adding some non-related products

and other objects in the recommendations to cut down on consumers' boredom toward quantities of homogeneous goods. As for how to avoid consumers' regret after purchase from the cocoon room, in the recommendations after payment, the platform should reduce or even exclude products of homogenization and append goods that are related in some aspects (like brand, function, or variety) to the purchased ones.

Two modes of algorithms are widely adopted in practice by far based on user portrait or based on the exterior features of products, which does realize what the e-commerce platforms have expected for with the consistent iteration of practice, that is, to simplify consumers' purchase decision-making process and to increase the possibility of purchasing and consumers' loyalty to the platform. Nevertheless, consumers' minds and needs are changeable and complicated, and algorithms running on the basis of similarity can hardly achieve complete comprehension about them and make totally correct predictions or recommendations. The two kinds of negative moods brought by the cocoon room along with their solutions can be an amendment to the recommending algorithms in practice, which is able to make the intelligent recommendation service offered by the platform more adaptive to meet users' needs and wants, making them satisfied and thus gaining more good opinions and loyalty from the consumers.

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