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Research on the Impact of Social Media Keyword-based Recommendation Methods on Users

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Abstract: The purpose of this study is to investigate the keyword-based recommendation strategy of social media and the impact of this recommendation strategy on user attitudes. In this study, three representative content creation social media platforms, Weibo, TikTok, and Bilibili, were selected to investigate their recommendation strategies, and a questionnaire was designed to simulate the content recommendation strategies of social media platforms after users input keywords to investigate users' attitudes towards keyword-based content recommendation strategies in social media. Through investigation, the keyword-based recommendation strategy of social media is mainly to recommend content explicitly associated with keywords. After the user returns to the home page, the system occasionally recommends a small amount of content implicitly associated with keywords. After a given keyword, social media users are more willing to click on content closely related to themselves when facing multiple recommended content. After a series of user choices, a series of entries recommended by the system to most users are explicitly associated with a given keyword. The content recommendation strategy with explicit association is still dominant in social media.

Keywords: Social media, keyword recommendation, Data analysis

1. Introduction

Mobile search refers to using mobile terminals for network search [1]. In the first half of 2020, a research report on China's mobile search industry by Ai Media Consulting pointed out that the number of mobile search users in China exceeded 700 million in 2019, and the epidemic will drive the scale of mobile search users to grow further [2].

In mobile search, recommendation systems are widely used in major social media. The recommendation system will build a user profile based on the user's past behavior and personal information and recommend relevant content based on the user profile [3]. On the search page of social media, the search bar will display the gray terms given by the system, trying to attract users to search for the terms recommended by the system.

The objective of this study is to explore the impact of social media's keyword-based recommendations on user stickiness. Keyword-based recommendation methods include explicit association recommendation and implicit association recommendation [4]. The implicit association recommendation methods are as follows: there is no matching keyword in the recommendation content, or there is no direct connection between the recommendation content and the keyword.

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Implicit association recommendation is necessary for the recommendation system, which can arouse extra interest and increase users' social media use time.

This study selected typical social media platforms, selected topic words, and took average usage time as a quantitative indicator of user engagement. According to the top 20 content recommendation strategies recommended by the platform, this study investigated the platform recommendation strategies based on the top 20 videos recommended by the search keywords. It returned to the upper-level page (home page) after the search. It refreshed it several times to observe the explicit and implicit correlation of the platform video type content recommendation. To avoid the impact of users' historical data on the system's recommendation content, this study first uses the method of not logging in to the account to enter specific words, check the recommendation situation of each social media platform, and then compares it with the platform recommendation situation after logging in to the personal account. Personal accounts contain a large amount of historical data. To avoid excessive concentration of recommendations based on historical data, this study will refresh the homepage several times before using personal accounts to ensure an even distribution of recommended topics.

After excluding social media platforms whose primary function is instant chat, Weibo, TikTok, and Bilibili are the three platforms investigated in this study. Weibo is a popular social media platform for users to independently create, obtain, and spread information, TikTok is a short video platform, and Bilibili is a video platform for young people [5-7]. All three platforms focus on content creation and sharing, and users can generally browse the content of the three platforms without logging in.

In addition, this paper designed a questionnaire based on the recommendation strategy of social media based on keywords, taking entries as the content form of social media recommendation to investigate the user's attitude towards the system's recommended content. The questionnaire consists of four parts: the first part is a survey of users' basic information, the second part is a survey of users' search volume for a series of recommended terms, the third part is a survey of users' preference for the relevance of recommended terms, and the fourth part is a survey of users' attitude towards repeated recommended terms.

In this study, it is found that after users enter specific keywords, the content recommended by various social media is explicitly associated. After users refresh their home page, social media does not recommend content explicitly related to specific keywords but will recommend a small amount of content implicitly associated with keywords. Social media users care more about the recommended content that is more closely associated with themselves and have a more substantial interest in the recommended content associated with a given keyword. However, they have a rejection attitude toward the repeatedly recommended content.

2. Research on Recommendation Strategies of Popular Social Media

2.1. Research on Recommendation Methods based on Keywords Without Logging in to the Account

The first given term is “Li Jiaqi”. Li Jiaqi is a representative of Chinese social media influencer. Influencer has a great influence on social media, which can provide consumers with decision-making [8]. The specific correlation is shown in table 1.

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Table 1: videos associated with the first given term in the top 20 recommended videos.

Top 20 videos		Weibo	TikTok	Bilibili
explicitly associated to the given term	After searching	19	20	20
	Back to the home page	0	0	0
	refreshing once	1	0	0
	refreshing twice	0	0	1
	refreshing 3 times	0	0	1
	refreshing 4 times	0	0	0
implicitly associated to the given term in top 20	After searching	1	0	0
	Back to home page	3	1	0
	refreshing once	4	2	3
	refreshing twice	3	2	2
	refreshing 3 times	2	0	2
	refreshing 4 times	3	0	2

The second given term is “Li Jiaqi event”. The specific correlation is shown in table 2.

Table 2: videos associated with the second given term in the top 20 recommended videos.

Top 20 videos		Weibo	TikTok	Bilibili
explicitly related to the given term	After searching	20	20	20
	Back to the home page	0	0	2
	refreshing once	0	0	0
	refreshing twice	0	0	0
	refreshing 3 times	0	0	0
	refreshing 4 times	0	0	1
implicitly related to the given term	After searching	0	0	0
	Back to home page	5	1	2
	refreshing once	4	0	1
	refreshing twice	4	1	2
	refreshing 3 times	2	1	3
	refreshing 4 times	2	0	3

2.2. Research on Keyword-based Recommendation Methods After Logging in to the Account

The first given term is “Li Jiaqi”. The specific correlation is shown in table 3.

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Table 3: Videos related to the first given term in the top 20 recommended videos for logged-in accounts.

Top 20 videos		Weibo	TikTok	Bilibili
explicitly related to the given term	After searching	16	20	20
	Back to the home page	0	0	2
	refreshing once	0	0	0
	refreshing twice	0	0	1
	refreshing 3 times	0	0	0
	refreshing 4 times	0	0	0
implicitly related to the given term	After searching	2	0	0
	Back to home page	6	0	0
	refreshing once	8	0	0
	refreshing twice	7	1	0
	refreshing 3 times	9	0	1
	refreshing 4 times	8	1	0

The second given term is “Li Jiaqi event”. The specific correlation is shown in table 4.

Table 4: Videos related to the second given term in the top 20 recommended videos for logged-in accounts.

Top 20 videos		Weibo	TikTok	Bilibili
explicitly related to the given term	After searching	16	20	20
	Back to the home page	0	0	0
	refreshing once	0	0	0
	refreshing twice	0	0	0
	refreshing 3 times	0	0	0
	refreshing 4 times	0	0	0
implicitly related to the given term	After searching	2	0	0
	Back to home page	8	1	0
	refreshing once	3	1	0
	refreshing twice	6	0	0
	refreshing 3 times	7	1	1
	refreshing 4 times	6	0	0

2.3. Analysis of Survey Results

Referring to figure 1 and figure 2, by searching for two keywords with strong relevance but different degrees of detail, the video content recommended by the three social media is explicitly related. In the process of repeatedly refreshing the home page, the three social media do not recommend the content explicitly associated with the keyword. Compared with it, the number of recommended contents implicitly associated with the keyword has increased, and the number of recommended content implicitly associated with the keyword fluctuates significantly after each refresh. The implicit association amount of the video recommended by Weibo is the highest among the three platforms,

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and the number of implicit associations recommended in the login state is more. TikTok and Bilibili recommend fewer implicit associations in the unregistered state.

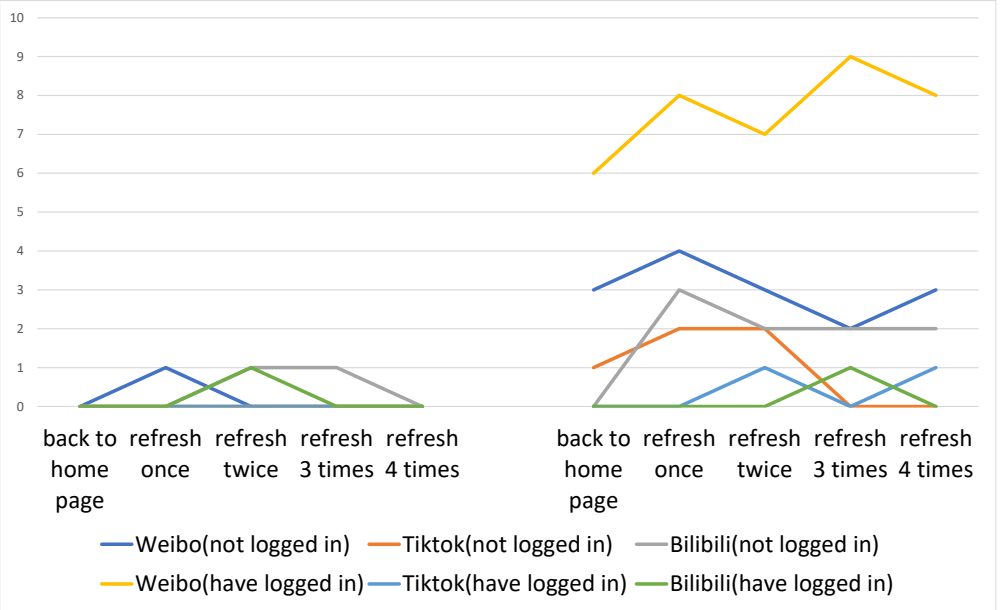

Figure 1: Recommendation strategy of social media (the first given term).

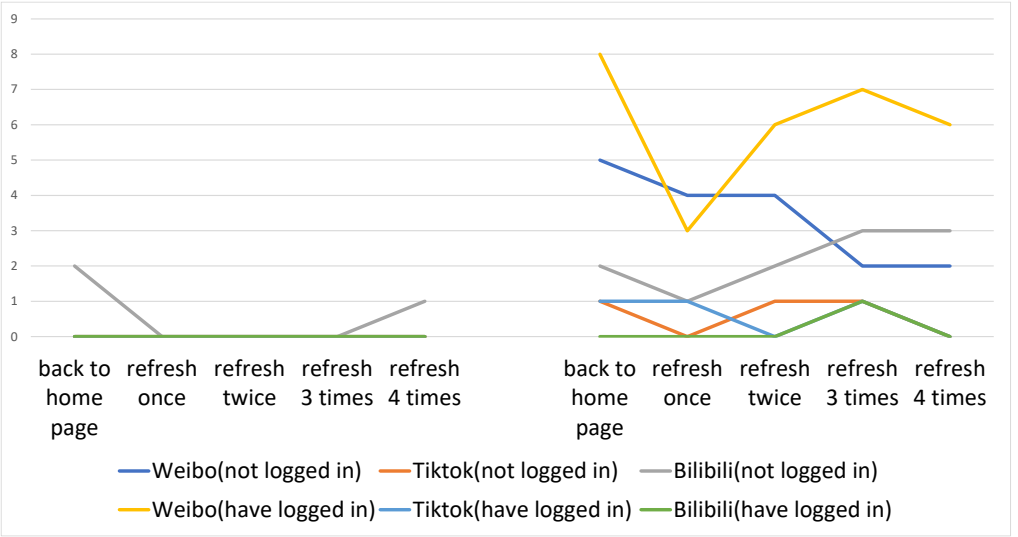

Figure 2: Recommendation strategy of social media (the second given term).

As shown in table 5, Weibo's per capita daily usage in the second quarter of 2023 was lower than that of Tiktok and Bilibili, while Weibo recommended more implicitly associated videos. Moreover, the video platform is more likely to attract users to spend more time browsing, so its per capita use time cannot fully measure the impact of keyword recommendation on user stickiness. Therefore, this study further designs keyword-based recommendation content from an individual perspective to measure the user's interest in the recommended content.

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Table 5: 2023 Q2 Per capita usage time of three popular social media [9,10]

Social media platform	2023 Q2 Per capita usage time
TikTok	133.9 min/day
Bilibili	94 min/day
Weibo	10.9 h/month

3. The Impact of Keyword-based Social Media Recommendation Strategies on User Attitudes

3.1. Research Problem

This study investigates users' attitudes towards recommended content in social media search interfaces. To simplify the research object, the content recommended by the system is defined as the content of the term type, which can be divided into the following four questions: How do social media users choose a series of terms recommended by the system? When the system is set to a keyword, users continue to recommend explicitly associated words if satisfied. Otherwise, they recommend words that are not explicitly associated. What kind of path does the user have to choose? If repeated terms are recommended, will the user's emotional attitude change? If there is a button that users can click to fill in terms for search automatically, will users be more interested in the same terms?

The first question explores how attractive the social media "Guess What You Want to Search" page is to users, and the second question explores what combination of terms the search bar at the top of the social media search page makes up and which group of terms users tend to choose. The third and fourth questions explore the impact of word frequency on social media users' attitudes.

3.2. Research Method

This paper studies social media users' attitudes toward search term recommendations by designing a questionnaire. As of September 25, 2023, a total of 455 questionnaires have been collected. Generating the user portrait of each interviewee through the questionnaire requires relatively large data, and the questionnaire space is limited. Therefore, this study chooses to set a specific situation and conduct research on it. "Li Jiaqi Incident", a recent hot event on the Chinese Internet, has aroused a lot of discussions. Therefore, this study takes the "Li Jiaqi Incident" as the context to design-related terms, and then designs a questionnaire for respondents to fill out. To better explore the user's attitude, this study uses the Likert scale to quantify the user's emotional attitude towards each recommended term. The number 1 means “disgusted”, the number 2 means “not interested”, the number 3 means “average”, the number 4 means “interested”, and the number 5 means “very interested”. All the scale questions were tested for reliability and validity by SPSS, and the qualified data will be further analyzed.

The questionnaire of this study is divided into three parts. The first part is the primary information survey of users, including five questions. This part of the survey respondents' gender, age, education, the most frequent use of social media, and the usual social media search habits based on recommendations.

The second part is to survey users' clicks on the terms of the "Guess What You Want to Search" page, which consists of two questions. The paragraph explanation between the fifth and sixth questions will briefly describe the circumstances of the Li Jiaqi incident to the interviewees so that they can better answer the subsequent questions and make a truthful response. The sixth question explores the respondents' interest in Li Jiaqi's case. The seventh question is the ranking question, respondents according to their interest level from the given 12 terms to choose their interest in terms, and each respondent needs to choose at least three terms of interest. As shown in Table 6, the 12 terms

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include six terms explicitly related to the present situation and six implicitly related to the present situation. After completing the questionnaire, the number of clicks on each term by the respondents will be counted, which can represent the attractiveness of the term to the social media users participating in the survey.

Table 6: Twelve given terms in the second part of the questionnaire.

Explicitly associated terms	Implicitly associated terms
Florasis	Crazy litter brother Yang
Does your salary rise	Mikuya apologizes
Job burnout	2023 fall recruitment starts
Good price makeup	The Rap of China 2024
Li Jiaqi fans reduced	Oppenheimer
Li Jiaqi, Fu Peng	Honkai: Star Rail

The third part attempts to investigate the path formed by a series of terms selected by the user. Referring to table 7, there are 7 terms in total, namely 4 terms explicitly associated with the preset context and 3 terms implicitly associated with the preset context. As is known in figure 3, the user's choice will eventually form 8 kinds of paths composed of 4 kinds of words, which also represent the user's 8 different emotional attitudes toward the recommended term. In figure 3, EAT means “Explicit Associated Term”, IAT means “Implicit Associated Term”, “+” means an interested attitude of user, and”-” means a not interested attitude of user.

Table 7: The given terms in the third part of the questionnaire.

Relevancy of term	term
explicit	Central media comment on Li Jiaqi event
	PUA
	Florasis coin
	Li Jiaqi re-creation video
implicit	BEE&FLOWERS
	Apple product announcement
	Fish Leong concert

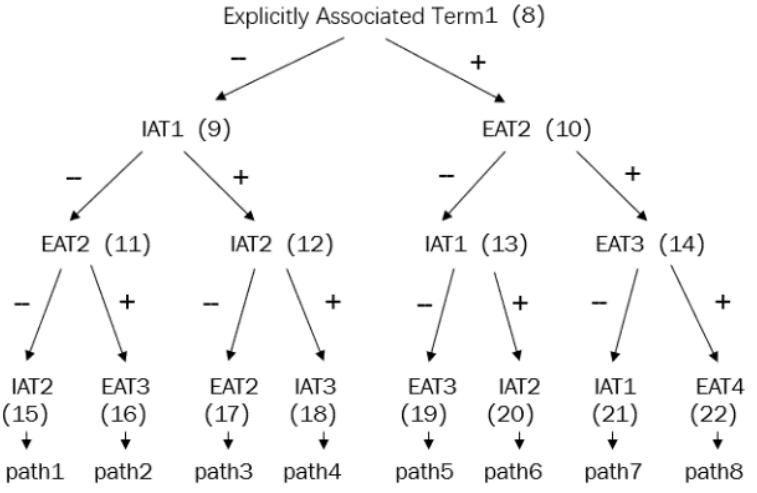

Figure 3: Eight paths according to users’ choices.

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The fourth part attempts to investigate the effect of repeated entries on users' attitudes. Since the user's attitude will cause these users to choose different paths of different terms in the third question, the questions designed in this part will make explicit related term 1, explicit related term 2, and implicit related term 1 repeat twice, to ensure that each person filling out the questionnaire can see that there are two different terms repeated, even if they choose different paths.

3.3. Research Data

The data in this study came from WeChat users. Of the 455 questionnaires collected, 213 were male, accounting for 46.81% of the total, while 242 were female, accounting for 53.19% of the total. Among them, there were 399 respondents aged 18 to 25, accounting for 87.69% of the total. There were 333 undergraduates, accounting for 73.19%; There were 38 respondents who were studying at graduate level or above, accounting for 8.35%; 77 respondents have graduated, accounting for 16.92%. 67.47% of them occasionally search for terms recommended by the system. WeChat, TikTok, QQ, and Weibo are the social media with high frequency used by these users.

Since the questionnaire has provided potential structural constraints for respondents, their choices can only be limited to eight paths, so it is not necessary to test the reliability and validity of the data.

After the reliability and validity analysis of the scale questions in the third part, the reliability and validity of 338 questionnaires in the third part are up to the standard, namely 311 questionnaires in path 8 and 27 answers in path 7. The alpha value and KMO value of the scale data of path 8 were 0.902 and 0.742 respectively. The alpha value of the scale data of path 7 is 0.735 and the KMO value is 0.649. The reliability and validity of the other six paths are not up to the standard at the same time.

To compare the changes in users' interest levels after the same term is repeatedly recommended, this study divides the topics with the same term repeatedly into a group. Since there are three repeated entries, three sets of data are tested for reliability and validity. The alpha value and KMO value of the first set of data about explicit associative word 1 are 0.854 and 0.723. The alpha value and KMO value of the second set of data about explicit association word 2 are 0.865 and 0.722. The third set of data for implicit association 1 has an alpha value of 0.922 and a KMO value of 0.727. The reliability and validity of the three sets of data meet the standards, indicating that these data can be analyzed.

3.4. Data Analysis

As shown in figure 4, the hits on the terms "Does your salary rise", "2023 fall recruitment starts", and "Job burnout" are respectively, Become the top three terms clicked by users. Salary, autumn recruitment, and occupation are all directly related to the employment status of Chinese college students and fresh graduates, so these groups are more willing to pay attention to these types of entries on social media.

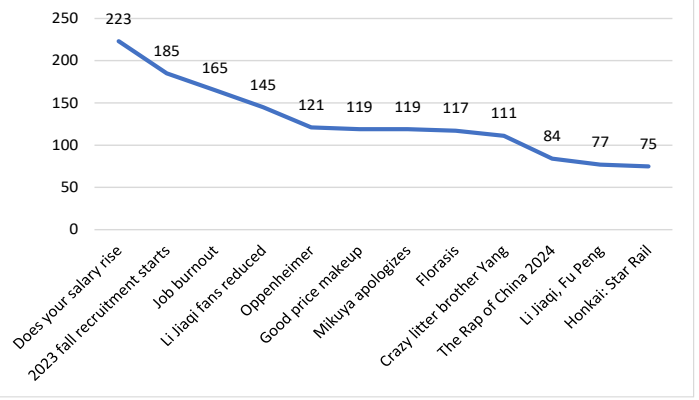

Figure 4: The user's clicks on the given terms.

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Most users are more interested in explicitly related terms and are willing to choose the term recommendation of the explicit path, and the overall degree of interest in each term changes slightly. There were 311 users choosing path 8. As shown in figure 5, users who chose path 8 scored 3.68 for the first term, 3.66 for the second term, 3.56 for the third term, and 3.33 for the fourth term. The user's score for each term in Path 8 is around 3.5, indicating that users are more interested in terms in path 8, but the degree of interest does not change much.

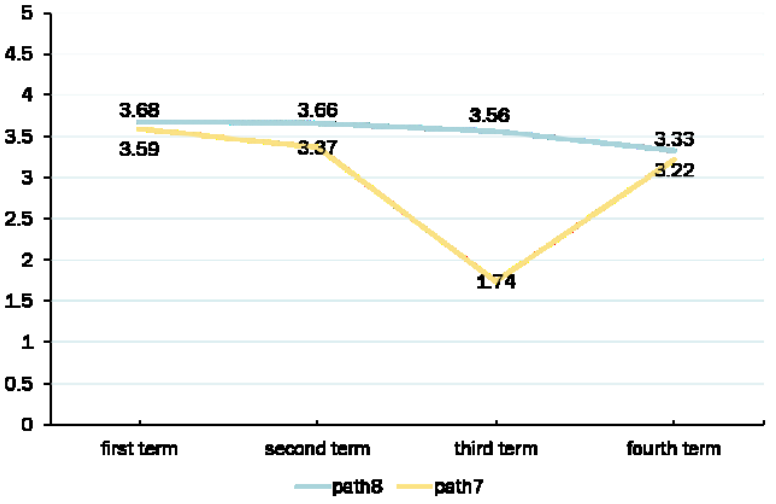

Figure 5: The degree of interest of users who choose path 7 and path 8.

The repeated recommendation of the term leads to the decline of the user's interest in the term. According to figure 6, the user's interest degree dropped from 3.28 to 3 after the recurrence of explicit association word 1, from 3.46 to 3.15 after the recurrence of explicit association word 2, and from 2.14 to 2.1 after the recurrence of implicit association word 1.

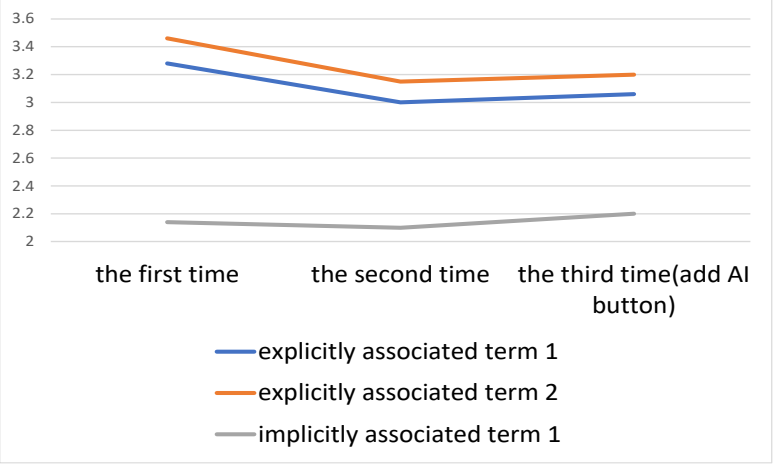

Figure 6: The degree of interest of users after the repetition of given terms.

As shown in figure 6, the questionnaire data showed that after adding an AI button to the search bar, users' interest in recurring terms increased slightly. The degree of interest of users in the occurrence of display-related word 1 increased from 3 to 3.06, the degree of interest in the occurrence of explicitly related word 2 increased from 3.15 to 3.2, and the degree of interest in the occurrence of implicitly related word 1 increased from 2.1 to 2.2.

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4. Conclusion

The keyword-based recommendation strategy of social media is mainly to recommend content explicitly associated with keywords. Users return to the home page after searching for keywords and constantly refresh the home page. In these processes, most of the content recommended by the system has nothing to do with the keywords previously searched, but occasionally a small amount of content implicitly associated with the keywords will be recommended. After a given keyword, social media users are more likely to click on content closely related to them when faced with multiple recommendations. If all the recommended content of the system is based on a given keyword, then most users show a higher interest in the content explicitly associated with the keyword, and finally a series of terms recommended by the system to most users are explicitly associated with the given keyword, which means that the content recommendation strategy of obvious association is still in a dominant position for social media.

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