

Which types of accounts on Weibo gain more attention during COVID-19 pandemic

Jinglong Duan

University of New South Wales, Sydney NSW 2052, Australia

d1643146364@gmail.com

Abstract. The current study aimed to examine which kind of Weibo accounts has the most influence when sharing COVID-19 related information. 247 Weibo accounts were divided into five categories: universities, celebrities, authoritative media, medical institutions and government departments. Using these accounts to form a virtual social network, calculate the mean, variance and standard deviation of Katz Centrality of each category of users which is combined with calculating the average number of likes, comments and retweets of each blog of each category users to find a more influential class. According to the research finding, celebrities have the most influence on general users, followed by authoritative media. However, combined with Katz Centrality, it can be found that celebrities have the least influence on social networks formed by accounts with a large amount of followers, while authoritative media is more influential in these two dimensions. Although more research is needed to investigate the relationship between social media platforms and the outbreak of COVID-19, findings suggest influential accounts should ensure the accuracy of their information so as not to mislead the public.

Keywords: Virtual Social Network, Weibo, COVID-19.

1. Introduction

In the past few years, the novel coronavirus become a constant companion to daily life, with certain different variants of the virus, this is a serious issue to deal with. According to [1], there have now been 116 million confirmed cases in 220 countries worldwide. For novel coronavirus infections, there is currently no specific drug to treat the disease, so prevention of infection is a key measure of health protection. The sharing of COVID-19 related knowledge and motivational information is conducive to improving self-protection awareness and self-protection [2]. It just so happens that Weibo is the most widely used social media platform in China.

With 370 million users, Weibo has become the most popular social media platform in China. During the COVID-19 pandemic, the total number of daily blogs posted by users increased by 25% compared to the same period last year. With such a larger daily active base, sharing epidemic information among users has been a crucial way of preventing this disease. In the past two years, there have been several studies on the relationship between social media and the transmission of epidemic-related information. For instance, a journal article[3] researched how social media can help prevent the infection of coronavirus. Later, an article [4] studied the influence of different types of Twitter accounts in spreading epidemic-related information in 2021.

From the perspective of nations, most previous studies are focused on American social platforms, while there are few studies on Chinese social media. Therefore, studying the influence of different types of bloggers on Weibo during the epidemic could help the supervision department monitor users with high influence to share more authentic and effective information, and make the information that plays a positive role in epidemic prevention spread more widely among general users.

From the perspective of research methods, the research on the influence of accounts on Twitter only used the ratio of retweets, likes and comments of different kinds of accounts to determine its influence. In a virtual social media network, there are amount of standards for measuring the importance of nodes. This paper will combine the above methods and calculate Katz Centrality of nodes in 247 accounts in Weibo which have lots of followers to find the most influential type of bloggers.

2. Literature Review

Sina Weibo is the most famous social media (SM) platform in China, which has almost 370 million users using Weibo monthly [5][6]. According to users' features, here are 3 types of users in this platform which include (1) official institutions, (2) Celebrities, and (3) Regular users, which have the largest number in this platform [3]. If users are well known, they would have more followers, thus, different types of users may have different influences. Followers are more likely to retweet, comment or like what they believe, and people who have more followers on social media (SM) may earn more trust from their followers [7]. From Weibo database, more than 200 million discussions are held each day about the information on the outbreak from the boast of COVID-19.

Since 2019, the outbreak of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) had been a serious issue worldwide[8]. According to the official report, there are more than 220 countries and 500 million people who have been infected with the coronavirus. Hence, how to use existing tools to analyze and detect the trend of COVID-19 has become the research direction of numerous professionals. From the study [9], building a relationship between social media platforms and epidemic information would be an excellent way to enact strategies, or predict the trend of the outbreak for both governments and professionals. Social media platforms are helpful to eliminate infections of coronavirus by the related information transmitted on the Internet.

The topic direction of public opinion on social media could predict the epidemic trend in advance. Research from [10] revealed that discussions on Weibo about the spread of COVID-19 started 10 - 14 days early before the peak of the spread in Wuhan, Hubei Province in China. In addition, other studies can prove that the proper usage of social media may have a positive impact on the integrity of the health care system. According to Giustini's research [11], the appropriate use of social media (SM) in medical fields and healthcare, especially in systematic reviews (SRs) has grown steadily over the past ten years. Studying how Internet users search for or seek out health-related information, and how this information is disseminated among these users, could provide people with valuable suggestions about health behaviour [12]. Besides this, there are other researches on how social media platforms have positive effects on the spread of coronavirus. An article[3] suggested that the various social media behaviours, such as browsing, searching, retweeting, as well as hot topics on platforms could lead people to make correct behaviours against the outbreak of pandemics.

Although, there is a strong link between the effective use of social media and healthcare during the outbreak of the coronavirus, how different kinds of users in social media influence coronavirus needs to be considered. The timely information sharing by different types of bloggers on social media platforms played a significant role in the prevention and control of coronavirus. For example, Kaminski et al.'s research examines which kinds of users' tweet earn more attention to COVID-19, and they claim that celebrities' and politicians' tweet play the most crucial role in sharing the epidemic situation [4]. Research and reports on how users on Weibo to what extent and which kind of users play the most significant role in sharing COVID-related information are lacking. Therefore, investigating to what extent bloggers influence the prevention of pandemics and comparing the influence of different types of bloggers by using social networks is essential.

3. Methodology

3.1. Data Collection

In this study, in order to study the influence of different bloggers on Weibo on general users during the outbreak of coronavirus 2, I collect the following lists of bloggers, and five keywords were used to classify the target bloggers, the keywords are celebrities, universities, government departments, medical associations and authoritative media. To make the data more representative, the target bloggers must be verified by Weibo and have more than 10,000 followers. To ensure the fairness of the data, I select nearly 50 accounts from the five categories of users, and manually checked at least 40 of these accounts have posted or retweeted information about COVID-19 from March 1 to April 1.

For celebrity searches, focus on long-established businessmen, movie stars, and doctors who have made outstanding contributions since the COVID-19 outbreak. Universities comprise the accounts of the top 200 universities in China (Baidu ranking) and several world-renowned universities. The medical associations include well-known hospitals in China, as well as non-profit medical consulting organizations and for-profit medical companies. Meanwhile, authoritative media consist of official media accounts. Government departments contain the accounts of various local governments.

Except for the following lists of bloggers, COVID19-related blogs posted by users above also be collected, it includes the total number of blogs posted or retweeted by five types of bloggers, the amount of likes, retweets and comments from March 1 to April 1.

The data shows that here are 8473 blogs posted by universities with 775,457 likes, 50,432 retweets and 89,978 comments in this period. Celebrities posted 995 blogs which followed by 37,754,655 likes, 20,001,674 retweets and 9,788,294 comments. The search for authoritative media reveals that 48,827 blogs, 68,602,008 likes, 3,566,652 retweets and 4,790,520 comments. For media agencies and government departments here are 6,114 and 28,712 blogs, 1,858,481 and 1,591,352 likes, 265,903 and 261,277 retweets, 233,260 and 268,849 comments respectively.

3.2. Data Analyze

Quantitative data will be analysed using Python programming language(version 3.8) and the Pytorch package in Python. First, from the following lists of 248 users, the relationship between these bloggers is obtained, and the adjacency matrix and social network graph of this social network could be drawn by using Pytorch. In this data analysis, I will ignore general users in the drawing of the social network. This is because 248 accounts in the experiment have almost 500 million followers, it is difficult to draw a full graph of such a number and these 248 accounts are of high importance and influence in this social network which indirectly proves that are significant to general users in Weibo.

For the aims of investigating who has the most influence in the social network of these users, the Katz Centrality will be calculated secondly. Then average retweets, comments, likes for each type of bloggers, likes/posts, retweets/posts and comments/posts would be calculated and draw a table to find which kind of users in five categories performance best in three results.

These results may show the influence of each type of blogger on general users on Weibo. After finding who plays an important role on general users, we have to find which kind of bloggers in 247 users have the highest centrality. Then, calculate the centrality. For five types of people, the results of Katz Centrality and the above figure are comprehensively compared to find which users have the greatest influence in such social networks.

4. Results

From March 1 to April 1, I collected 247 bloggers in five categories who posted 93,121 posts related to COVID-19 on Weibo. Table 1 shows the average amount of reposts, likes and comments of each blog published by five different types of micro-bloggers in this period. Although celebrities posted the least number of blogs during this month, they received the most likes, retweets and comments per blog on average.

Table 1. The interaction between microblogs of different types of accounts and general users.

	The number of blogs	Likes/Blogs	Comments/Blogs	Repost/Blogs
Universities	8,473	91.52	10.62	6.22
Celebrities	995	37,944.38	9,837.48	20,102.18
Authoritative Media	48,827	1,444.26	101.36	75.37
Medical Institution	6,114	303.97	38.15	43.49
Government Department	28,712	55.42	9.36	9.09

From 247 bloggers who produced a virtual social network, the Katz Centrality of all nodes is shown in Fig. 1. In this figure, id from 0 to 47 are authoritative media, 47 to 97 represent medical institutions, when $98 \leq id \leq 146$, the nodes are universities, id from 147 to 193 are government departments, and the rest part celebrities. According to the figure above, the node with id is 0 (CCTV News) has the largest Katz Centrality with a value of 0.37. At the same time, almost all nodes (celebrities) numbered after 200 have centrality less than 0.

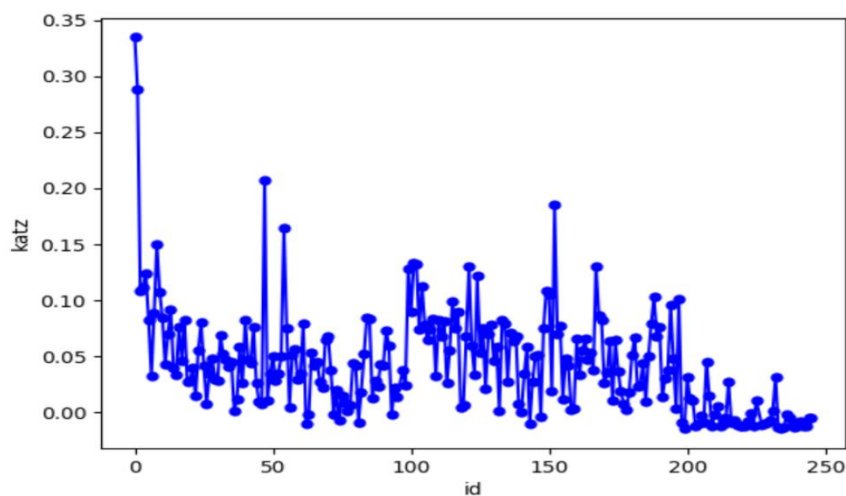


Figure. 1. Katz Centrality of 247 accounts in virtual social network.

Table 2 shows the mean, variance and standard deviation of Katz Centrality of five types of accounts in their social network. Obviously, the average Katz Centrality of authoritative media reaches 0.0890 which is the highest. Government departments, medical institutions, universities and celebrities follow.

As for variance, although the variance of authoritative media is not the smallest, the fluctuation of data is not very large, while the fluctuation of data of celebrities is larger reach 2.1492. The last column shows the standard deviation, with the highest standard deviation in the authoritative media, which means there are certain nodes that have quite a high Katz Centrality in this class. On the contrary, the class of celebrities has the smallest standard deviation, meaning that the Katz Centrality of almost all celebrities nodes is very close to 0.0029.

Table 2. The mean value, variance and standard deviation of Katz Centrality of different kind of accounts.

Heading level	Mean	Variance	Standard Deviation
Authoritative Media	0.0890	0.0065	0.0809
Medical Institution	0.0202	0.0005	0.0224
Universities	0.0159	0.0006	0.0249
Government Department	0.0520	0.0019	0.0432
Celebrities	0.0029	2.1492	0.0046

5. Discussion

The purpose of this study was to find which kind of accounts in Weibo is the most influential during the outbreak of COVID-19. I predicted that authoritative media has more influence during the pandemic. The data suggest that for general users, each piece of coronavirus information from celebrities received the most attention and interaction. However, among 247 accounts with high number of followers I selected, Katz Centrality of celebrities is the lowest. Authoritative media ranked the second in the five categories of attention to general users and have the highest Katz Centrality in the social network I built. Therefore, the hypothesis was supported. However, this is based on the fact that the celebrities we select must be associated with authoritative media during the pandemic.

By looking at COVID-19 related blogs from 50 celebrities I have chosen for this study, the majority of their blogs were from retweeting authoritative media between March 1 and April 1. At the same time, authoritative media have the highest Katz Centrality, so I think celebrities help authoritative media reflect their influence.

Even though the blogs published by medical institutions, universities, government departments and authoritative media have less interaction with followers than those of celebrities, celebrities have the lowest average Katz Centrality in these five types of social networks, so users in this category cannot spread their information through other users with higher followers. On the contrary, among the 247, there are lots of bloggers with high influence on general users who follow authoritative media and retweet the information published by authoritative media, so authoritative media should be the most influential type of users.

As the policy protects the privacy of Weibo accounts, one limitation should be considered. When obtaining the following lists of bloggers, I can only observe the first 200 accounts. Although I try to find the blogger who follows others less than 200, I can only observe the first 200 accounts, the data may not be very complete.

6. Conclusion

This research aimed to find which kind of Weibo accounts has the most influence during the pandemic. Based on a qualitative analysis of Katz Centrality and the average number of likes, comments and retweets of blogs published by different types of accounts on Weibo, it can be concluded that celebrities influence general users most, but when combined with Katz Centrality, it can be seen authoritative media has the most influence in big V accounts in Weibo in which this kind of accounts could influence celebrities, medical institutions, universities, government departments most, then reflect their influence through celebrities, medical institutions, universities, and government departments.

This research clearly illustrates authoritative media has the most influence, but it also raises the question of how to calculate the extent to which it affects general users through the other four types of accounts. To better understand the implications of these results, future studies could compare the Katz Centrality of five different types of users dynamically in different time periods, this is because the following lists of accounts are not invariable. This study completed the comparison of the influence of

different types of accounts on Chinese social platforms to share COVID-19 information during the epidemic, which can better help the supervision departments regulate and control the spread of fake news, so as to help the public to protect themselves.

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