

Research on the Application of Computer Big Data Technology in News Dissemination

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Abstract—With the continuous advancement of science and technology, the development speed of information technology is getting faster and faster, and the amount of information and data in all walks of life in the society is increasing rapidly, which has an important impact on the development of the industry. Faced with such a huge amount of information, big data technology came into being. How to find news with more reportable value from this information has become the main force now. Predictive analysis can be carried out through big data technology, which has important guiding significance for the mastery of market conditions. The article applies evolutionary game big data theory into the research of this problem. We establish an evolutionary game model for news communication recipient groups and between news readers and news disseminators, and draw corresponding guiding significance based on the model.

Keywords—Computer, big data, news dissemination, herd effect, evolutionary game model

I. INTRODUCTION

Artificial intelligence AI anchors, artificial intelligence writing robots, and big data news reports are all practical explorations carried out in the field of news media in my country in recent years. Artificial intelligence technology, big data concepts and technologies play a key role in them. In order to further promote the development of my country's news media industry, it is precisely the reason why this article focuses on the application of artificial intelligence technology and big data in news media. Today, when modern science and technology are highly developed, communication technology has become more developed, and there are more and more ways for us to obtain information. Journalism has also entered the era of big data, and the work pressure faced by journalists will also increase. In order to be able to better process this information, big data technology is introduced into journalism. Big data technology can efficiently analyse and process massive amounts of information, and mine useful information in massive amounts of information through information collection, data storage and processing. To a large extent, this method can help journalists reduce work pressure and obtain useful information more conveniently. And big data technology can also spread news through visual means, which greatly improves the timeliness of news [1]. Today, when information technology is highly developed, big data contains a lot of information. How to process and use this information is an important issue we face. News writing and editing itself need to face a huge amount of information. With the help of big data technology, it will provide many conveniences for journalists in their future work.

II. CONSTRUCTION OF NETWORK PUBLIC OPINION DISSEMINATION MODEL ON NEWS APPS

A. Analysis of the status quo of the spread of online public opinion on news apps

The construction of the network public opinion dissemination model on news apps needs to be based on the status quo of the network public opinion dissemination on news apps. The analysis of the current situation of the spread of online public opinion on news apps not only analyses the existing information characteristics of the online public opinion on news apps and the use environment of news apps, but also considers the information source and dissemination channels of the online public opinion. The information source medium of the online public opinion refers to the information release medium of an online public opinion event or a hot public opinion information, and the communication channel refers to the transmission channel and the transmission carrier in the process of public opinion information dissemination [2]. Through the classification and analysis of the information sources of 4783 online public opinion data monitored in 2019, 55.1% of the online public opinion comes from news websites, and news media including traditional news media and portal news websites are still the main sources of public opinion information. This is because the "Internet News Information Management Regulations" promulgated by the state have strict restrictions on news release: websites established by traditional media can only obtain the right to first publish news after approval. In addition, traditional news media and portal news websites have a complete organizational structure and relevant professional talents. Compared with other sources of public opinion information, their advantages are obvious.

B. Analysis of the main body of online public opinion dissemination on news apps

1) *The main body of dissemination of online public opinion on news apps.* There are three main types of network public opinion dissemination subjects: ordinary network users, that is, participating in network information transmission in the name of individuals. Opinion leaders refer to Internet users who can provide ordinary Internet users with information that they do not have, and have a certain effect on their behaviour and thoughts [3]. Network media, that is, traditional media network sites, portal news sites, and new aggregate news sites, etc.

2) *The interactive mode of the communication subject.* The development of wireless network technology has given great freedom in the mobile network space. This freedom has not only increased the spread and evolution of public opinion information at a rapid rate, but has also changed the role of the subject of public opinion in passively receiving

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information in the traditional media era. News APP provides an open platform for the main body of public opinion [4]. The main body of public opinion can play a more role in the process of network public opinion transmission and can actively participate in every link of public opinion information transmission. In fact, online public opinion dissemination subjects form a huge network of relationships on news apps, and different from traditional public opinion dissemination networks, the relationship between online public opinion dissemination subjects on news apps is not stable, and the differences in opinions are relatively high. Big.

The dissemination network of online public opinion on this kind of news APP is a collection of dissemination subjects, and the dissemination subjects are independent individuals with a certain way of interaction. The human-to-human interaction network includes a personal relationship network composed of relatives, friends, colleagues, etc., and a virtual relationship network provided by the network, such as online friends, "fans", and so on. Regardless of whether it is an actual personal network or a virtual network, the personal public opinion subject in the network will not only be affected by the overall network information environment, but also in the process of interacting with other public opinion subjects in the network [5]. At present, the realization of the interaction mode between the main body of the network public opinion dissemination on news apps depends on the function settings of the client. Some news apps with functions such as comment, sharing, and forwarding can share and disseminate public the opinion information in a private network.

III. NEWS COMMUNICATION MODEL

News Audience 1 and News Audience 2 choose View A, the expected benefit U_1 is

$$U_1 = aP_0(1) \quad (1)$$

News Audience 1 and News Audience 2 choose View B's expected revenue U_2 as

$$U_2 = b(1-P_0) \quad (2)$$

When $U_1 > U_2$, the expected benefit of the news audience choosing viewpoint A is greater than the expected benefit of choosing viewpoint B.

Let $aP_0 > b(1-P_0)$, we get: $P_0 > \frac{b}{a+b}$ that is, when $P_0 > \frac{b}{a+b}$, the news audience's expected benefit of choosing viewpoint A is greater than the expected benefit of choosing viewpoint B. We set a certain topic of online public opinion. In the embryonic stage, the number of news audiences who understand the topic and hold opinions is N , then the number of news audiences holding opinion A is NP_0 , and the number of news audience holding opinion B is $N(1-P_0)$. If the income of news audiences is understood as the number of news audiences who are influenced by themselves and choose the same views as themselves, then the expected number of news audiences affected by a news audience holding a viewpoint A is aP_0 . If the duration T of the entire online public opinion topic is equally divided into n identical t time units, after t unit time, the number of news audiences holding A opinions

in the news audience will become NaP_0^2 . Similarly, after unit time, the number of news audiences holding B views in the news audience will become $Na(1-P_0)^2$. Then after t unit time, the proportion of the expected number of news audiences holding A viewpoint in the whole news audience group is:

$$P_1 = \frac{aP_0^2}{(a+b)P_0^2 - 2bP_0 + b} \quad (3)$$

Then after n t unit time, the proportion of the expected number of news audiences holding A views in the news audience group is:

$$P_n = \frac{aP_{n-1}}{(a+b)P_{n-1}^2 - 2bP_{n-1} + b} P_{n-1} \quad (4)$$

$$f(P) = \frac{aP}{(a+b)P^2 - 2bP + b} \quad (5)$$

Taking the derivative of formula (2), we get:

$$\frac{df(P)}{dP} = \frac{a[b - (a+b)P^2]}{[(a+b)P^2 - 2bP + b]^2} \quad (6)$$

From the monotonicity analysis, we can see that $f(P)$ increases monotonously in $[0, \sqrt{\frac{b}{a+b}}]$, and decreases monotonously in $[\sqrt{\frac{b}{a+b}}, 1]$. And because $D f(1) = f(\frac{b}{a+b}) = 1$, and $\frac{b}{a+b} \in [0, \sqrt{\frac{b}{a+b}}]$, we can draw a trend chart of the evolution of news audience views, as shown in Figure 1.

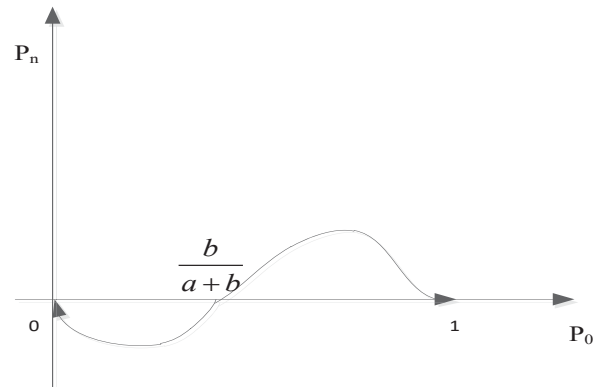


Figure 1. The evolution trend of news audience views

From Figure 1, the following results can be obtained:

(1) When $P \in (0, \frac{b}{a+b})$ $f(P) < 1$, then $P_n = f(P) * P_{n-1} < P_{n-1}$, that is, P_n defined by equation (3) decreases monotonically and converges to zero. That is, when $P_0 \in (0, \frac{b}{a+b})$, after n t unit time evolution, all news audiences in the news audience group will choose viewpoint B.

(2) When $P \in (\frac{b}{a+b}, 1)$, $f(P) > 1$, then $P_n = f(P) * P_{n-1} > P_{n-1}$, that is, P_n defined by formula (3) increases monotonically and converges to 1. That is, when $P_0 \in (\frac{b}{a+b}, 1)$, the news audience's strategy of choosing viewpoint A is evolutionary and stable. After n unit time evolution, all news audiences in the news audience will choose viewpoint A.

(3) When $AP_0 = \frac{b}{a+b}$, the ratio of choice viewpoint $P_0 = \frac{b}{a+b}$ and choice viewpoint B will be maintained at $b:a$. However, this ratio is not stable, because once there is a random factor that increases the number of news audiences who choose viewpoint A. Then according to the above discussion, the number of news audiences in the entire news audience will evolve toward a certain point of view, until the number of news audiences who choose another point of view tends to zero [6].

IV. MODEL SOLVING

A. The replication dynamic equation of news publishers' choice of publishing information strategy

The expected return of a news publisher who chooses to publish information is U_1 (release), the expected return of choosing not to publish information is U_1 (not published), and the average return of news publishers is U_1 (average). Then: $U_1(\text{Release}) = (R-C)q + (-C)(1-q) = Rq - C$. $U_1(\text{No release}) = -Wq - W(1-q) = -W$. $U_1(\text{Average}) = (Rq - C)p + (-W)(1-p)$. From this, we can get: The dynamic equation of copying the news publisher's choice of publishing information strategy is:

$$F(p) = \frac{dp}{dt} = p[U_1(\text{release}) - U_1(\text{average})] = p(1-p)(Rq - C + W) \quad (7)$$

(1) When $q = \frac{(C-W)}{R}$, $\frac{dp}{dt} \equiv 0$, it means that all levels are stable.

(2) When $q \neq \frac{(C-W)}{R}$ is set, let $\frac{dp}{dt} = 0$, and $p=0$ and $p=1$ are two stable states. Taking the derivative of $F(p)$: $\frac{dF(p)}{dp} = (1-2p)(Rq - C + W)$, there are two cases currently:

1) When $q > \frac{(C-W)}{R}$, $\frac{dF(p)}{dp}|_{p=1} < 0$, $\frac{dF(p)}{dp}|_{p=0} > 0$, $p=1$ is the equilibrium point, and the news publisher chooses the strategy of publishing information as an evolutionary stable strategy. (Formula 1)

2) When $q < \frac{(C-W)}{R}$, $\frac{dF(p)}{dp}|_{p=1} > 0$, $\frac{dF(p)}{dp}|_{p=0} < 0$, $p=0$ is the equilibrium point, and the news publisher chooses not to publish information strategy is an evolutionary stable strategy.

B. The replication dynamic equation of news audiences choosing to follow strategies

The expected income of news audiences who choose to follow the strategy is U_2 (following), the expected income of

choosing not to follow is U_2 (not following), and the average income of news audiences is U_2 (average). Then: $U_2(\text{following}) = rp + (1-p)(-s) = rp + sp - s$. $U_2(\text{not following}) = -wp$. $U_2(\text{average}) = q(rp + sp - s) + (1-q)(-wp)$. From this, the dynamic equation for copying news audiences choosing to follow the strategy is:

$$F(q) = \frac{dq}{dt} = q(1-q)(rp + sp + wp - s) \quad (8)$$

(1) When $p = \frac{s}{r+s+w}$, $\frac{dq}{dt} \equiv 0$, it means that all levels are stable. (2) When $p \neq \frac{s}{r+s+w}$, let $\frac{dq}{dt} = 0$, $q=0$ and $q=1$ are two stable states. Deriving $F(q)$ to get $\frac{dF(q)}{dq} = (1-2q)(p+sp+wp-s)$, currently, there are two cases:

1) When $p > \frac{s}{r+s+w}$, $\frac{dF(q)}{dq}|_{q=1} < 0$, $\frac{dF(q)}{dq}|_{q=0} > 0$, $p=1$ is the equilibrium point, and news audiences choose to follow the strategy is an evolutionary stable strategy. 2) When $p < \frac{s}{r+s+w}$, $\frac{dF(q)}{dq}|_{q=1} > 0$, $\frac{dF(q)}{dq}|_{q=0} < 0$, $p=0$ is the equilibrium point, and the news audience chooses not to follow the strategy is an evolutionary stable strategy.

C. The replication dynamic relationship between news publishers and news audiences

Based on the above analysis, a dynamic relationship diagram of the copying of news publishers and news audiences can be drawn, as shown in Figure 2.

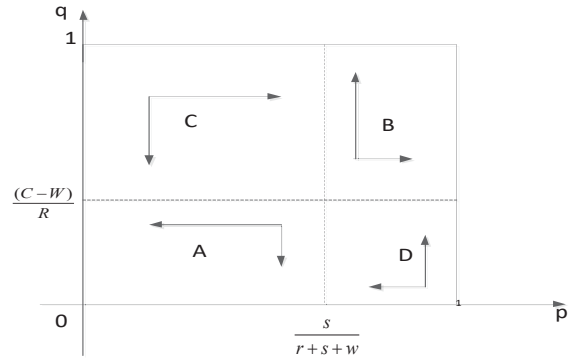


Figure 2. The dynamic relationship diagram of the replication of news publishers and news audiences

Figure 2 shows that in the herding effect game between news publishers and news audiences, (0,0) and (1,1) are both evolutionary stable strategies of the game [7]. The game evolution process will eventually converge to which strategy set It depends on the initial state of the process. (1) When the initial state falls in area A, the game converges to (0, 0), that is, (no release, no follow) is the inevitable choice of news publishers and news audiences. (2) When the initial state falls in area B, the game converges to (1, 1), that is, (publish, follow) is the inevitable choice of news publishers and news audiences. (3) When the initial state falls in the C and D regions, the evolution direction of the game is uncertain. It is possible to enter the A region and converge to (0, 0); it is also

possible to enter the B region and converge to (1, 1).

V. CONCLUSION

In summary, both artificial intelligence technology and big data can better serve the development of news media. On this basis, the content of this article to promote the organic integration of artificial intelligence technology and people, to ensure the objectivity and authenticity of big data news reports, provides a highly feasible artificial intelligence technology and big data application path. In order to better promote the development of my country's news media, the combination of artificial intelligence technology and big data in the news media field also needs to be paid attention to.

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