

Food and Drug Public Opinion Mining Algorithm Based on Big Data

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The current algorithm ignores the impact that emotive words have on shaping public opinions and attitudes about food and drugs. To address this problem, a internet public opinion mining algorithm for food and drug safety based on an improved LSA+SVM algorithm is proposed in this paper. A case analysis can indicate the status, causes, and changes of the public opinion of the food and drug Internet. Several guidance countermeasures are proposed which have practical application.

Keywords: Big Data, Food and Drug, Public Opinion, Mining Algorithm

1. INTRODUCTION

In recent years, food poisoning incidents due to substandard food have occurred frequently. Food safety is an important issue affecting all households, and has therefore received much public attention. The level of food safety is a dynamic process, and is closely related to the level of economic development of a country. Different stages of economic development have different characteristics. This is especially true for China, which has undergone a profound transformation of its economic and social structures. Since the beginning of this, a series of food safety incidents have taken place in China, which has led to the general public mistrusting food safety. After such food safety incidents, more and more people are posting and expressing attitudes, opinions and reactions to food safety events on internet platforms and communicating with the government and the media. The government, the media and the netizens are important to the food safety as conveyors of opinion and information, while a food safety event is the object and the Internet is the carrier of the communication and development. The network for public opinion on food safety has become an important platform for

social co-governance of food safety risk. It is an important way for the government to monitor the trend of food safety and public opinion since the awareness and promotion of risk management for food safety is of paramount importance (Barlow et al., 2015; Garciaserna et al., 2015).

In the literature, a food and drug public opinion mining algorithm based on R+Hadoop framework is proposed (Yu, 2017). With the powerful functions of Hadoop in the distributed processing field and the advantages of the R language in the data statistical model, a framework is constructed for mining public opinion on the R+Hadoop-based WeChat platform. Taking 4025 food and drug WeChat articles as research data, the collection and distribution of public opinion, and the visualization of mining results with this framework are discussed. In the literature, a food and drug public opinion mining algorithm based on micro-blog interaction algorithm is proposed (Gao et al., 2015). The micro-blog interaction algorithm is researched and used. By quantifying the sensitivity of micro-blogs in food and drug public opinion, and analyzing the interaction of users, the micro-blog sensitive public opinion dissemination model for food and drug public opinion is constructed. In the literature, an algorithm for mining public opinion about food and drugs is proposed, based on key words (Lian and Xue, 2016). The

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SVM text orientation classification method of the Chinese automatic word formation algorithm and the feature extraction method of information bottleneck are combined for the automatic dynamic construction of a special word library. The concept of an information bottleneck is introduced. The big data containing public opinion about food and drugs is classified based on the nature of the keywords used in the article. Combining with the method of concept extraction, the word clustering result is mapped to the sememes of the HowNet. These are the results of the mining of public opinions about food and drug posted on the Internet. In the literature, a parameter inversion algorithm is proposed for a food and drug public opinion mining model based on a neural network (Liu et al., 2017). By improving the classic SIR communicable disease transmission model, an Internet public opinion mining model for food and drug is built. The parameter inversion of actual cases is obtained with this model, which enables future public opinion trends to be predicted. Compared with the Markov prediction model, the proposed algorithm can accurately predict the popularity of public opinion. You and Chen (2016) proposed a food and drug public opinion mining algorithm based on improved particle swarm and BP neural network. The Baidu index of hot topics is chosen as a time series index for forecasting the trend of Internet public opinion. The prediction model for food and drug Internet public opinion is constructed by using particle swarm optimization and the BP neural network algorithm. The algorithm is verified and analyzed using real cases (Shahajada et al., 2019; Tarshi and Rajendra, 2019; Nguyen, 2019).

The aim of this research is to analyze the annual data for events related to Chinese medicine in 2016, applying the food and drug safety Internet public opinion mining algorithm based on the improved LSA+SVM algorithm. Through an empirical analysis of hot events, the current situation, causes, and changes in the Internet public opinion of traditional Chinese medicine are revealed. Combined with the knowledge of public opinion, sociology, psychology, journalism, communication, and computer science, the public opinion of traditional Chinese medicine is researched. The guiding countermeasures of Internet public opinion of traditional Chinese medicine are proposed and the shortcomings of the above algorithms are considered. The framework of the overall research consists of the following:

- (1) construction of an index system for food and drug safety Internet public opinion;
- (2) classification of emotive words of food and drug safety public opinion;
- (3) spatial vectorization and classification of the feature word of food and drug safety Internet public opinion;
- (4) case analysis: public opinion expressed on Internet in regard to the introduction of law pertaining to traditional Chinese medicine is examined; the characteristics of Internet public opinion of traditional Chinese medicine are discussed, and some applicable countermeasures are suggested.
- (5) Conclusions of the research and the further research in the future.

2. FOOD AND DRUG PUBLIC OPINION MINING ALGORITHM BASED ON BIG DATA

2.1 Construction of the Index System of Food and Drug Safety Internet Public Opinion

2.1.1 Determination of Index Items of Network Public Opinion Monitoring and Early-Warning System of Food and Drug Safety

For monitoring and selecting early-warning index items in the Internet public opinion for food and drug safety, combined with professional knowledge of food and drug safety, the index items are constructed from the four dimensions of public opinion: source dimension, public opinion communication dimension, public attention dimension, development tendency dimension. (Chen et al., 2015; Pagadala et al., 2015).

(1) Public opinion source dimension

It is very important to know the source of information posted on the Internet in regard to food and drug safety as the quality and reliability of information depend on its source. Some Internet sites are forced to give false, biased and misleading reports on food and drug safety incidents under the pressure of financial gain, which leads to misguided public opinion. Therefore, when information about food and drug safety is collected from a public opinion forum, the source of the information must be authenticated as reliable. The source dimension is shown in Table 1.

Food and drug safety incidents reported on government websites generally have a high level of credibility. They are also important sources of information about food and drug safety and can shape public opinion expressed via the Internet. Food and drug safety information released by large news websites and news media websites has certain credibility, especially when incidents related to food and drug safety occur suddenly and unexpectedly. In these cases, public participation tends to be relatively passive, and is mainly concerned with browsing and forwarding information. In the real-time forum/BBS/community and other websites with obvious user interaction and/or spontaneous production of content, the reliability of the information is poor. However, on these websites there is a greater level of public participation. The posts are often emotive and express strong attitudes towards occurrences related to food and drug safety reported via the Internet which is an important source of public opinion.

(2) Public opinion communication dimension

The public opinion communication dimension mainly include two aspects: The change of public opinion information flow, and the distribution of public opinion. The change of public opinion information flow reflects the change value of the total amount of information related to food and drug safety Internet public opinion events during a certain period of time, such as the number of reports, the amount of forwarding, and the number of comments. The distribution of food and drug safety public opinion can be determined by analysing the volume of food and drug safety incidents being

Table 1 Source Dimension of Food and Drug Internet Public Opinion.

Source	Authority	Accuracy	Public participation	Leading	Typical representative
Government website	High	High	Low	Internet media	Xinhua net, People's Daily Online
Large news website	Medium	Medium	Medium	Internet media	Sina, Netease
News media website	High	High		Internet media	People's daily, Xinhua News Agency
Current affairs forum	Low	Low	High	Netizen	People's Daily Online forum, Phoenix net forum
BBS/community/Micro-blog	Low	Low	High		Netizen Mop, Tianya, WeChat

Table 2 Indicator in Public Attention Dimension.

First level indicator	Second level indicator	Third level indicator
	News public opinion	Information activity
		Release information number
		Cumulative number of browses
		Cumulative number of comments
		Cumulative number of reprints
		Cumulative number of posts
		Cumulative number of clicks
Public attention	Forum public opinion information activity	Cumulative number of following posts
		Cumulative number of reprints
		Cumulative number of readings
	BBS/Social Website public opinion information activity	Cumulative number of comments
		Cumulative number of following posts
		Communicative breadth

circulated in different geographic areas over a certain period of time. This determines the maximum area of the information flow and the diffusion trend and distribution, which can be determined by the users' personal information and IP address. The change of public opinion information flow is related to the time dimension and the distribution of public opinion is related to the space dimension.

(3) Public attention dimension

The public attention dimension is a very important dimension of online public opinion about food safety information. It is used to indicate concern regarding information about food and drug safety, and public opinion expressed through different channels during a certain period of time. This dimension can be mined to find the hot spots of public attention to food and drug safety incidents and to see the changing trends in public opinion. This indicator has multi levels created from items sourced from public opinion as shown in Table 2.

From Table 2, it can be seen that public attention dimension correspond to different second-level and third-level indicator items according to the different sources from which public opinion has been derived. Forums/BBS/social networking sites are thematic and purposeful, and can be used for research on the popularity of information of public concern. Therefore, the public attention indicators are mainly reflected by the amount of statistical information, the number of clicks, the amount of forwarding, the number of posts, and the breadth of distribution.

(4) Development tendency dimension

According to the content of public opinion posts on food and drug safety, the indicators in development tendency dimension

can be divided into two secondary indicators: information content sensitivity and netizen attitude tendency. The content sensitivity indicator evaluates the current information content in terms of insensitive, a little sensitive, sensitive, and more sensitive. The netizen attitude tendency indicator evaluates the attitude to the current information content: supportive, opposed or neutral.

2.1.2 Construction of the Indicator System

The construction of the Internet public opinion monitoring and early-warning indicator system for food and drug safety is done by a process combining qualitative and quantitative analysis. Public attitudes and opinions are subjective concepts that can be qualitatively described, while the collection, analysis and diversification of food and drug safety public opinion data are objective concepts to be quantitatively described. Therefore, the construction of such a system needs to be based on a sound understanding of how public opinion posted on the Internet evolves. The level of reliability of the specific public opinion is evaluated. Through scientific methods, the evaluation indicators of all levels are selected to construct the indicator system.

By using the complete indicator system for food safety Internet public opinion, the source, scope and direction of the collected information can be clearly determined. It is helpful to fully understand the evolution of public opinion about food safety, and mine the valuable information. The comprehensive analysis of this public opinion can be achieved through the combination of quantitative and qualitative methods. In order to analyze the current status and characteristics of public opinion on China's food safety,

combined with existing research results, this paper constructs a relevant Internet public opinion indicator system. From the four dimensions of public opinion source dimension, dimension of public opinion communication, public attention dimension, and development tendency dimension, and then from each dimension, and decomposing it into new multi-level indicators, an indicator system for the monitoring and early-warning of food safety Internet public opinion U is constructed, which is the foundation for the subsequent mining of food and drug public opinion. The calculation is:

$$U = \{U_1 + U_2 + U_3 + U_4 + U_5\} \quad (1)$$

where U_1 , U_2 , U_3 , U_4 and U_5 are the public opinion source dimension, dimension of public opinion communication, public attention dimension, development tendency dimension, respectively.

2.2 Classification of Feature Words of Food and Drug Safety Public Opinion

The most important link of food and drug safety public opinion early-warning is the extraction and classification of emotive words. First, emotive keywords related to the quality and safety of food and drugs are selected according to the above indicator system. The open source Nutch crawler is used to mine public opinion data to obtain the related URL list of public opinion on food (Keiji, 2015; Kireziova et al., 2015). By using the standards in the lexicon dictionary of HowNet emotional analysis, words with emotive connotations are extracted: mainly adjectives, adverbs, and nouns. The text containing emotive word is quantified and saved in the following format:

$$(a_i, T, link, t_i, r, W, U) \quad (2)$$

Where a_i are emotive words, T is the time to obtain the emotive words, t_i is the release time of the text obtaining the emotive words, r is the two-value field, representing whether the URL is reprinted, W is the importance weight of the source page of the emotive words, when r is "yes", W is assigned the weight of the emotive words. The impact of information sources and the semantic orientation of information on the consequences of related enterprises will affect the weight of related public opinion emotive words. Assume the importance of the emotional emotive words that appeared in the text vector of the food and drug public opinion is $tfidf_{ik}$, this is expressed as:

$$tfidf_{ik} = tf_{ik} \times idf_k \quad (3)$$

Where N is the number of files, tf_{ik} is the frequency of the appearance of the emotive words a_i , n_{ik} is the times of the appearance of the emotive words a_i . It is necessary to calculate the total number of emotive words N_i that appear in the whole text vector, expressed as:

$$tf_{ik} = n_{ik}/N_i \quad (4)$$

In Equation (3), idf_k is the inverse document frequency of the emotive words a_i , that is, the words that less appear in the whole article but have obvious features, which is given by:

$$idf_k = \log \frac{N}{n_{ik}} \quad (5)$$

However, in the actual text expressing public opinion about food, the adverbs and nouns are generally found in longer sentences, making the emotional tendency more obvious. Hence, the weight of the emotive words are more significant in a long text, which causes the log function to be zero and loses the influence of the judgment. Meanwhile, the quality and safety of food and medicine generally includes the empirical coefficients of language and voice to highlight important features. The release or improvement of national policies and regulations will have a significant impact on the food industry. A supplement value of a sovereign value and a reference offset $offset$ is added to the primary of the weight. Then the weight of the emotive words of food and drug public opinion is obtained as:

$$W = \frac{tf(t_i, T) \cdot \log(N/idf_k) + 0.01}{\sqrt{\sum_{T=1}^N [tf(t_i, T) \cdot \log(N/idf_k) + 0.01]^2}} * offset \quad (6)$$

The weight of the quantized text is obtained and stored by this formula, so that the next step is the spatialization and classification of the vector.

2.3 Spatialization and Classification of Feature Word Space of Food and Drug Safety Internet Public Opinion

The emotive words of food and drug public opinion, which do not belong to the same concept space, are stored in a single text vector. But the emotional tendency is greater and the spatial dimension is too high, so the dimension needs to be reduced for combination and classification (Liu et al., 2016). An improved LSA+SVM algorithm is used for the classification of emotive words appearing in public opinion posts about food and drug safety. Text preprocessing is the process of calculating and improving the weight. LSA divides the text of public opinion on food and drug safety into different local feature spaces by means of singular value decomposition, which avoids the complication of having one word with multiple meanings (homonym) and one meaning for multiple words (synonym). This means that the meaning of an emotive word in a public opinion text is clearer and unequivocal (Li et al., 2016). The spatialized feature word spatial vector of food and drug public opinion is decomposed and stored as $m \times n$ matrix, and is expressed as:

$$A = (a_{ij})_{m \times n} \quad (7)$$

The emotional feature matrix of food and drug safety is preprocessed. If the emotional feature words of food public opinion are synonyms and the semantic correlation is higher, they are placed into the same class. The probability of the emergence of synonyms in different categories of words will be lower. Then the matrix A is decomposed into a combination of a set of multiple classes of matrices, which is given by:

$$A = USV^T \quad (8)$$

Where U and V are the vector matrices left and right $A^T A$, $S = \{\beta_1, \beta_2, \dots, \beta_r\}$ is the singular value matrix of the matrix A and $\beta_1 \geq \beta_2 \geq \dots \geq \beta_r \geq 0$ SVD compresses the whole USV^T space to obtain k-rank matrix, which is expressed as:

$$A_k = U_k S_k V_k^T \quad (9)$$

Where S_k is the basic singular value matrix after decomposition, which has been decomposed into a multi-local matrix according to its semantic correlation.

The similarity relation of the obtained feature words is obtained with inner product $A_k A_k^T$ of row vectors of A_k , that is:

$$\begin{aligned} A_k A_k^T &= (U_k S_k V_k^T) (V_k S_k V_k^T) = (U_k S_k^T V_k^T) \\ &= (U_k S_k) (U_k S_k)^T = S S^T \end{aligned} \quad (10)$$

where $S S^T$ is the inner product of the i th row and the j th row, k is the dimension after the dimensionality has been reduced. The new text vector is input to the SVM classifier for the correlation classification.

Given the characteristics of public opinion on food and drug safety, it is difficult for common classifiers to achieve the purpose of ascertaining emotional tendency and risk. Therefore, it is necessary to add the modifying factor O_{a_i} to the local matrix of the feature words. The modifying factor is based on the simultaneous occurrence of emotional word a_f and degree adverb a_g . Their weights are multiplied, and the value is taken as the priority judgment of the severity of the matrix (Yang, 2017). The calculation is given by:

$$O_{a_i} = W_{a_f} \times W_{a_g} \quad (11)$$

The local matrix obtained with the singular value decomposition and modification with O_{a_i} of S_k is sorted. The linear relation of several singular values is simulated as a regression jump curve with correlation. When $O_{a_i} > 0$, this indicates that the positive significance of the local matrix of the food and drug safety public opinion is strong. When $O_{a_i} = 0$, there is no obvious jump of the curve, which usually fluctuates near the transverse axis, and the tendency of the local matrix tends to neutrality. Such comments tend to be close to the facts of the narrative. When $O_{a_i} < 0$, the negative significance of the local matrix is stronger. It shows that the author of the document has a strong response to the event and has a clear critical attitude to the company in question. The closer to 1 or -1 the value of O_{a_i} , the more serious is the emotional tendency of the feature word.

The implementation of food and drug public opinion mining algorithm based on big data is as follows.

- (1) Implementation of training algorithm. A large number of public opinion classification training texts are selected to train the improved LSA+SVM algorithm to form a standard model of public opinion classification and early-warning parameters. The three basic parameters of penalty function coefficient α , linear maximum gap λ , and kernel function coefficient ξ are obtained. The process of training algorithm is as follows.

Input: The feature word vector set $A = \{a_1, a_2, \dots, a_n\}$, the reference offset *offset*.

Output: Classification parameter model $M = \{\alpha, \lambda, \xi\}$.

- (2) Implementation of test algorithm. The parameter model and SVM classifier are used to classify emotional tendency of the new feature text. First, it is divided into two levels according to the positive and negative of the modified factor, and then according to the weight, it is divided into five levels: more severe public opinion (S level) and severe public opinion (A level), moderate public opinion (B level), mild public opinion (C level) and required attention (D level). The positive public opinion is integrated into enterprise feedback information and innovation information, denoted as P level. The process of the test algorithm is as follows.

Input: Test feature word set to be classified $A' = \{a_1, a_2, \dots, a_n\}$, the reference offset *offset*.

Output: Classification results $Tab = \{S, A, B, C, D\}$.

According to the modification of reference offset and modifying factor, and training with the training texts, the model is more accurate and efficient for food and drug safety incidents in real-time implementation of crisis judgment and the results are returned promptly to the enterprise as an early warning (Li, 2016).

3. CASE ANALYSIS OF FOOD AND DRUG PUBLIC OPINION MINING BASED ON BIG DATA

The events of 2016 that involved traditional Chinese medicine are discussed. Three representative cases are selected for public opinion analysis according to the heated discussion index and selection criterion of public opinion.

The heated discussion index indicates the extent to which the event spread through the mass media of news and digital media, WeChat, and micro-blog and is weighted to obtain the average influence of the event over a fixed period of time.

The selection criterion of public opinion is also called public opinion value. It is an objective criterion for selecting and measuring news events, social hot topics and whether social phenomena can be monitored by public opinion, including news attribute, networking, and sensitiveness.

- (1) General situation analysis of Internet public opinion of traditional Chinese medicine in 2016

The terms 'Chinese medicine', 'traditional Chinese medicine', 'Chinese herbal medicine' and 'Chinese patent medicine' are used as the keywords to monitor public opinion about traditional Chinese medicine in 2016 through the food and drug public opinion mining model, employing the proposed algorithm. The public opinion data on traditional Chinese medicine in 2016 is shown in Figure 1.

In 2016, the total number of events related to traditional Chinese medicine was more than 17.75 million, with an average of nearly 1.48 million per month. 9,456,760 articles were released on WeChat, accounting for 53.3%, and 3,956,011 articles were released on micro-blog, accounting

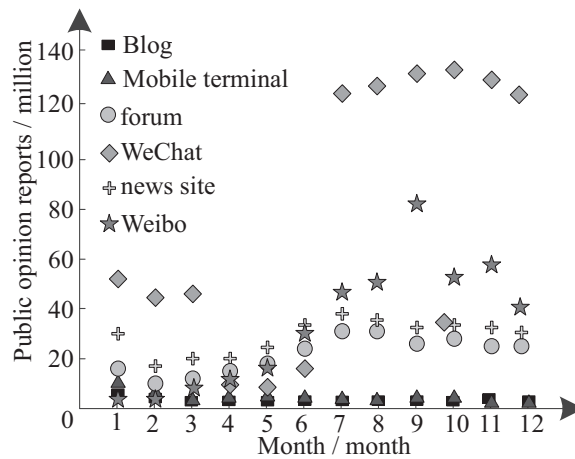


Figure 1 Spreading Trend of Public Opinion on Traditional Chinese Medicine in 2016.

for 22.3%, showing that the WeChat and micro-blog platforms had become the main forums for public opinion.

From Figure 1 it can be seen that the data related to traditional Chinese medicine in 2016 shows wave-type development characteristics. A sudden increase of data is seen in July, and this trend is maintained until December. During this period, public attention focused on events such as the sulphur detected in the cough medicine based on fritillaria (a bulbous Chinese plant), the dispute between Chinese and western medicine caused by the death of actress Xu Ting, and the introduction of a law governing Chinese medicine.

(2) Ranking of traditional Chinese medicine hot topic public opinion in 2016

Internet news platform tend to be authoritative and have great influence on the public. WeChat ranked top in the two fields of instant messaging and social networking in 2016. However, micro-blog has the highest number of netizen interactions. Therefore, the weights of these three media channels are 0.5, 0.3, and 0.2, respectively, indicating their level of influence.

Media coverage volume = news *0.5 + WeChat *0.3 + micro-blog *0.2

Heated discussion index = $60 + 40 * (\text{media coverage volume} - \text{media coverage volume less than the minimum}) / \text{the maximum of media coverage volume}$. The maximum of media coverage volume is set to 100 and the minimum is set to 60.

The traditional Chinese medicine hot topic public opinion in 2016 is given by:

Heated discussion index = $60 + 40 * (\text{media coverage volume} - 700) / 6188$

Ranking of traditional Chinese medicine hot topic public opinion in 2016 is shown in Table 3.

For the hot topic of events in 2016 related to traditional Chinese medicine, in the policy-related area, the heated discussion index following the introduction of Chinese medicine law is highest, reaching 95.47. The event of sulphur being detected in the cough medicine of Fritillaria was reported by the media. The opinion of the netizens was greatly influenced by the media. The companies involved in this incident responded quickly to negative public opinion. This

incident has reference significance for companies to respond to Internet public opinion. The dispute between Chinese and western medicine has a long history. The death of Xu Ting, who opted for Chinese medicine rather than chemotherapy, once again raised concerns and fueled the ongoing debate. The role of netizens in this incident is to increase the popularity of public opinion. The introduction of Chinese medicine law was a positive move according to public opinion. Public reaction to sulphur being detected in the fritillaria cough medicine and to the dispute between Chinese and western medicine are typical of negative public opinion about traditional Chinese medicine. These three events are all news. And it is Internet news. At the same time, these three events are all sensitive news. Finally, the case of the introduction of Chinese medicine law is analyzed to determine the public opinion expressed via the Internet in regard to traditional Chinese medicine.

(3) Event background

In 1983, Chinese medicine experts, such as Dong Jianhua, a Chinese physician and academician of the Chinese Academy of Engineering, first proposed the introduction of a Chinese medicine law at the National People's Congress. However, it was not until 2008 that the Standing Committee of the Eleventh National People's Congress formally incorporated the law into legislative planning. In 2009, the Central Committee of the Communist Party of China issued the State Council's opinions on strengthening the reform of the medical and health system. They believed that it was necessary to accelerate legislation pertaining to traditional Chinese medicine. In December 2011, the Ministry of health submitted the draft of a Chinese medicine law to the State Council. In December 2015, the State Council submitted this draft to the Standing Committee of the National People's Congress for deliberation. In December 2015, and August and December of 2016, after three deliberations by the Standing Committee of the National People's Congress, the first Chinese medicine law was passed on December 25th.

(4) Analysis of event process

The introduction of the Chinese medicine law took a long time to come into effect. The monitoring time is set for the

Table 3 TOP 5 of Ranking of Traditional Chinese Medicine Hot Topic Public Opinion in 2016.

Ranking	Public opinion	News	WeChat	Micro-blog	Media coverage volume	Heated discussion index
1	Introduction of Chinese medicine law	6962	7698	1993	6188	95.47
2	GMP authentication cancellation	4735	5218	62	3944.8	80.99
3	Publication of the white paper of China's Chinese medicine	4957	3345	2001	3881.5	80.58
4	Upgrading of the pharmaceutical industry and development of traditional Chinese medicine promoted and deployed by the State Council	3548	4641	132	3193.2	76.13
5	Ejiao counterfeiting event	3898	2831	381	2875.4	74.07

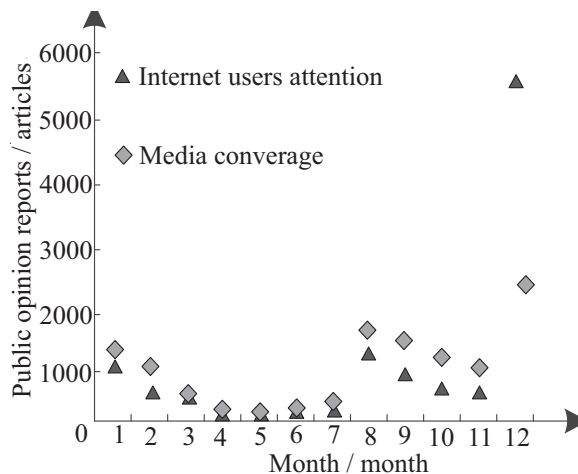


Figure 2 Spreading Trend of Internet Public Opinion Regarding Chinese Medicine law.

whole year of 2017, as shown in Figure 2. This event is divided into three stages.

Stage 1: From January to April. In December 2015, the State Council submitted the draft of the law for traditional Chinese medicine to the Standing Committee of the National People’s Congress for deliberation. The public began to pay attention to this event, which had a smaller impact, but lasted for a long time.

Stage 2: From July to September. The second draft of the Chinese medicine law in August was submitted to the Standing Committee of the National People’s Congress for deliberation. The high-quality medicinal materials, wild medicines, Tibetan medicine and Mongolian medicine to be included in the medical insurance catalog were widely discussed in public.

Stage 3: From November to December. The number of news reports and the intensity of netizens’ attention rose sharply. In December 19th, the third draft of the traditional Chinese medicine law was submitted to the Standing Committee of the National People’s Congress for deliberation. In December 25th, the twelfth sitting of the twenty-fifth session of the Standing Committee of the National People’s Congress examined and adopted the law governing traditional Chinese medicine in the People’s Republic of China. A large number of media outlets reproduced and reported the news, and the public actively participated in the discussion.

In December 25th, the law governing traditional Chinese

medicine was officially established and was put into effect in July 1, 2017. The aims of this Chinese medicine law was to protect, support and develop traditional Chinese medicine. It covers in great detail many aspects of Chinese medicine including: practice, protection and development, promotion and cultivation, scientific research, tradition and cultural transmission, safeguards, practitioners’ ethical and legal responsibilities, establishment and improvement of a management system, protection of intellectual property rights, regulation of Chinese medical institutions, and the quality of Chinese herbal medicines.

Media coverage and netizens’ attention to this event are shown in Figure 3.

From Figure 3, it can be seen that, during the incubation period of official promulgation of the Chinese medicine law, the amount of media coverage and netizens’ attention are relatively low. After December 25th, the twelfth sitting of the twenty-fifth session of the Standing Committee of the National People’s Congress formally passed the law regulating traditional Chinese medicine, causing widespread concern and discussion among the public. From December 25th to December 26th, this news developed rapidly, reaching the highest level in December 26th, and then gradually declining. Netizens’ attention is consistent with the trend of media coverage, but it is slowing down.

(5) Comparison of different media platforms

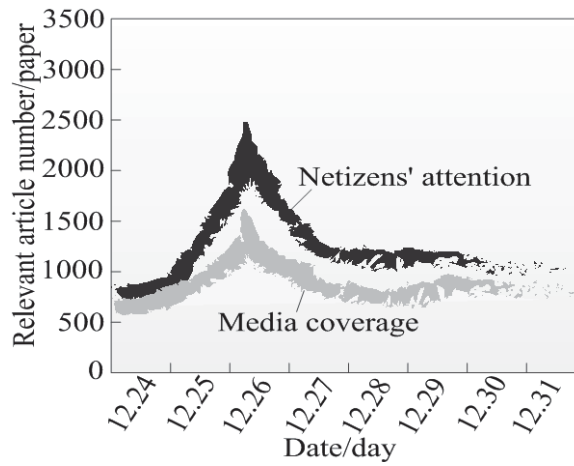


Figure 3 Spreading Trend of Internet Public Opinion on the Introduction of Chinese Medicine Law.

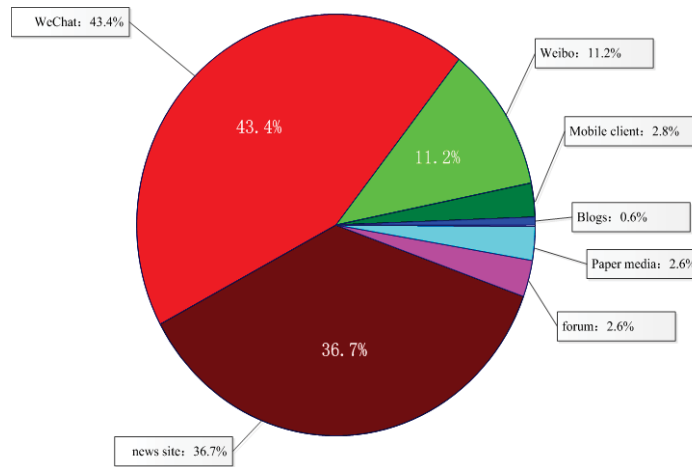


Figure 4 Proportion of Sources of Media Information Following the Passing of Chinese Medicine Law.

Table 4 Introduction of Chinese Medicine Law Hot WeChat TOP5.

Ranking	WeChat subscription account	Title	Release date	Reading number
1	Natural medicine	Xi Jinping signed the presidential decree, and the Chinese medicine law was promulgated.	12.26	100000+
2	Service account of the auxiliary platform of traditional Chinese Medicine	Xi Jinping signed the presidential decree, and the Chinese medicine law was promulgated.	12.25	100000+
3	Chinese medicine newspaper	Chinese medicine will be implemented in July 1st next year. See the five highlights.	12.25	99878
4	Saibailan	The law of traditional Chinese medicine is coming out soon! The trillions of markets have come	11.28	58926
5	Chinese medicine Book Club	5 days more valuable than gold, please pay attention to the law of traditional Chinese medicine.	1.24	57619

From the data analysis, 17,728 data items were retrieved for 2016. The number of reports in the news media totaled 6,961 (39.3%), with the news portal accounting for 36.7%, and the print media for 2.6%. We-Media reported 10,767 times, accounting for 60.7%: 43.4% for WeChat and 11.2% for micro-blog as shown in Figure 4.

WeChat has the greatest dissemination of information about

the Chinese medicine law, and more than 100,000 users have subscribed to Chinese medicine law information on WeChat. WeChat and other media platforms are becoming increasingly important as promulgators of information.

(6) Analysis of public opinion

Regarding policy related to traditional Chinese medicine,

the government plays a leading role. For the newly promulgated or revised traditional Chinese medicine policy, government departments should note the following three points.

- 1) Strengthening the implementation of policy. The implementation power of policy is a main way of strengthening the implementation power of the government. Although Chinese medicine law was finally established after thirty years, it has yet to be fully implemented. The laws should be revisited and strengthened so that they have a better chance of being implemented.
 - 2) Promote the law and its advantages in order to strengthen public approval and acceptance. The law should be explained so that it is easily understood by the general public, and the public has a greater awareness of the law and its implications. Staff in relevant government departments should be given training in the Chinese medicine law so that they understand it and can help to implement it successfully.
 - 3) Policy effect evaluation. To evaluate the effect of the implementation of the Chinese medicine law, an appropriate framework and evaluation system should be designed and implemented using both quantitative and qualitative assessment; this would determine whether the law is achieving its intended objectives. A comprehensive evaluation of emerging or potential problems should be conducted, and suggestions made for improvement through amendments or supplementary regulations.
- (7) Proposing the adaptive countermeasures
- 1) In China, the guidance of netizens' opinion comes under government public governance, and the government has the responsibility of guiding netizens. An early-warning and emergency handling mechanism for Internet public opinion should be actively established and continuously improved, so as to create a harmonious environment for the communication of public opinion via the Internet.
 - 2) The new media, as a communicator of information, has the social responsibility of ensuring that moral standards and legal norms are complied with, including the basic responsibilities under the conventional state, and the responsibility to be investigated after emergence of the problems.

4. CONCLUSIONS

Food safety has become a hot issue in the Internet media. With the continuous exposure of food safety events on the Internet, the Internet has become the carrier and disseminator of information and opinions about food safety and is the main platform where people can express their views and feelings about food safety events. Therefore, the research of food safety Internet public opinion is significant for China's food industry. The research contents of this paper are as follows.

- (1) Based on the present research results, combined with the professional knowledge of food safety, the indicator items for monitoring and early-warning system of food safety Internet public opinion are constructed from the four dimensions of public opinion: source dimension, dimension of public opinion communication, public attention dimension, and development tendency dimension.
- (2) The open-source Nutch crawler is used for the mining of the relevant public opinion corpus to obtain a URL list of public opinion about food. Using the word set dictionary of HowNet's sentiment analysis, emotive words are extracted.
- (3) The improved LSA+SVM algorithm makes the classification of public sentiment and emotional words more accurate. The meta-search technology is used to extract public opinion information. The reference offset is added to optimize the tendency weight of emotive items. The modifying factor is added to improve the LSA+SVM algorithm. Finally, the classification and early-warning model for public opinion is constructed.

In China, research on Internet public opinion began relatively late. Although researching and improving the supervision of Internet public opinion is an important way to promote the harmonious development of modern society, there are still shortcomings in the overseeing of public opinion posts. For example, in China, the legal management of Internet activity is not comprehensive enough. It is necessary to formulate as soon as possible a unified and special Internet management law applicable to China's national conditions. Unfortunately, public opinion research is not attracting much interest from scholars. It is imperative, therefore, to cultivate a group of diverse talents with Internet and modern media proficiency.

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