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Emergency Network Public Opinion and Coping Strategies Based on Emotion Feature Extraction Algorithm

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Abstract: *With the development of the Internet in today's society, the prevalence of public opinion also heralds the trend of networking. More and more people are starting to express their opinions and opinions on the Internet. Therefore, the analysis of emergency Internet public opinion and the research on coping strategies are becoming more and more important. Although there are many studies on emergency Internet public opinion analysis and coping strategies, the existing research still needs to be supplemented. This article was a certain discussion on the empathy strategy of characteristic diplomatic language. First, the relevant background of the title was introduced at the beginning of the introduction section. Emergency Internet public opinion analysis and coping strategies were analyzed and studied, and thinking was made. Second, various algorithms were proposed. The algorithm was established based on the emotion feature extraction algorithm, which has provided a theoretical basis. Third, for the response methods of emergency Internet public opinion, the emergency characteristics of college Internet public opinion in the era of big data were introduced. The application of big data in Internet public opinion has carried out emergency Internet public opinion analysis research. Finally, this paper conducted experimental research on the subject of emergency Internet public opinion analysis and coping strategies research based on emotion feature extraction algorithm. The research results showed that the research model constructed in this paper has improved the effectiveness of emergency Internet public opinion by 15.12%.*

Keywords: *Emotional Feature Algorithm, Emergency Network Public Opinion, Public Opinion Information, Emergency Information System*

1. Introduction

Public opinion involves all aspects of politics, economy, culture, ecology, security and society, which are closely related to national governance and social stability. The development of online public opinion behind the data presents the characteristics of big data. Based on the characteristics of big data technology, a data-driven public opinion prevention strategy is adopted, and an emotional feature extraction algorithm is used to design a public opinion prevention information system to achieve Internet public opinion prevention management. Through more scientific, reasonable, active and timely discovery and public opinion early warning, malicious dissemination and prevention of emergencies can be prevented. Therefore, it is necessary to study the emergency Internet public opinion analysis and coping strategies based on the emotion feature extraction algorithm.

The dissemination of public opinion began to be combined with the Internet, and the openness of the Internet promoted the rapid dissemination of public opinion information. Emergency Internet public opinion analysis and coping strategy research has become a major issue that must be faced in the network. Based on this, many scholars have carried out research on emergency analysis. Li Yi discussed the evolution trend and characteristics of Internet public opinion on animal epidemic emergencies to identify the structural characteristics of key nodes in the public opinion dissemination network, so as to explore the stages of animal epidemic public opinion dissemination [1]. Li S proposed that with the development of social media, people believed that users were more willing to express their views on emergencies online, which generated a lot of public opinion information about emergencies [2]. Cao Wei constructed social public opinion monitoring and early warning indicators, and discussed how to control the crisis of Internet public opinion [3]. Li Y believed that in the event of

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a public emergency, netizen supervision would correct the abnormal behavior in the operation of public power to strengthen the supervision of the operation of public power, which affected government decision-making and improved the efficiency of government governance to a certain extent [4]. Tatiana Fourth Alvarez believed that the analysis of online forums was an effective means of emergencies. However, with the development of network technology, the number of users on the network is increasing. There is a lot of useless information in cyberspace, especially in emergencies. This not only brings a lot of pressure to future data processing, but also affects the work efficiency and accuracy of public opinion surveys [5]. The prediction of emergencies of Internet public opinion is the key to the government's timely control of Internet public opinion and social stability. Starting from the "S-curve" theory, Liu Xue studied the prediction of public opinion in the big data environment, and gave three new prediction models [6]. Chen Hai pointed out that the rapid development of social networks and the emergence of online public opinion made the government more and more pressure to deal with emergencies. He also constructed an Internet public opinion dissemination model and analyzed the rationality of its dissemination [7]. Emergency Internet public opinion analysis and coping strategies are hotly discussed in life. At the same time, it has also attracted attention in academia.

With the rapid economic development today, the quality of emergency response strategies for online public opinion is getting higher and higher. Scholars have also paid much attention to the response strategies of emergency Internet public opinion. Wang Xiaojuan believed that when the leading party responded to online public opinion, it should emphasize "fast", that is, express its opinions as soon as possible. It should pay attention to "accuracy", that is, to act proactively and accurately. It is necessary to achieve "level" and take appropriate action. It is also necessary to focus on "efficiency" and improve the ability to respond to public opinion [8]. Wen Hongying formulated emergency plans in advance for the frequent occurrence of online public opinion incidents in colleges and universities. Colleges and universities announced the truth of the incident in a timely manner, and diligently trained commentators to be good at teaching and guiding netizens [9]. Fu W proposed that this should focus on public opinion intervention strategies when police were involved in public health emergencies and build cohesive police-community relations [10]. Zhang Xiaowei suggested that in the new media era, the government should consolidate the status quo of social development. He proposed an effective public opinion network management and control scheme to promote the stable development of society [11]. From the perspective of the public opinion network of higher business schools for emergencies, Zhou F analyzed the problems existing in the public opinion network of higher business schools in dealing with emergencies [12]. Based on the analysis of the new coronary pneumonia epidemic information system, Cao W divided it into three subsystems: netizens, network media, and government. He established a dynamic model of the new coronary pneumonia network [13]. Liu E put forward a series of scientific and reasonable guidelines and coping strategies, which could provide a certain reference and benchmark for the promotion of public opinion in the field of emergency management in colleges and universities in Langfang [14]. Based on the emergency Internet public opinion, this paper studied the emergency Internet public opinion analysis and coping strategies based on the emotion feature extraction algorithm.

Today, with the rapid development of the information society, the way the public expresses their emotions and expresses opinions has also changed from the traditional news communication mode to the network media with multimedia as the carrier, from the traditional newspapers and magazines to the fast and widely influential WeChat, Weibo and other communication Channel change. In order to better respond to emergency Internet public opinion, this paper discussed in detail the statistical analysis and countermeasures based on emotional characteristics.

2. Emotion Feature Extraction Algorithm Model

(1) Wavelet transform

In signal processing, the Fourier transform uses sine and cosine functions of different frequencies to represent a signal. The distorted signal is converted into a sinusoidal signal with a specific frequency, phase and amplitude [15]. The Fourier transform is often used to analyze stationary signals, which reflects the relationship between the spectral function and the time function. However, the Fourier transform cannot reflect the characteristics of the relevant spatial region when extracting the spectrum.

Wavelet transform is to transform and scale the scale function and mother wave to obtain a wave sequence. The wave sequences are perpendicular to each other. Assuming that the function $\psi(t)$ is square integrable, when $\psi(t)$ satisfies the following conditions, $\psi(t)$ is called the mother wavelet.

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$$\int_{-\infty}^{+\infty} \frac{|\psi(t)|^2}{|\omega|} d\omega < \infty \tag{1}$$

For the continuous case, the wavelet sequence is:

$$\psi_{a,b}(t) = \frac{1}{\sqrt{|a|}} \Psi\left(\frac{t-b}{a}\right) \tag{2}$$

Wavelet decomposition is to decompose the original EEG signal into different frequency bands. The signal is decomposed into approximate components and details. The low-frequency components of the upper layer are further divided into low-frequency components and high-frequency components. x(t) is decomposed by Formula (3).

$$x(t) = \sum_{k=-\infty}^{+\infty} C_{N,K} \phi(2^{-N}t - k) + \sum_{j=1}^{N} \sum_{k=-\infty}^{\infty} D_{j,k} 2^{-j/2} \psi(2^{-j}t - k) \tag{3}$$

In the above formula: $C_{N,K}$ is the kth low frequency component of the Nth layer. $D_{j,k}$ is the kth high frequency component of the jth layer. ϕ is the scaling function.

The original signal is decomposed by the diode. After each layer, the length of the low frequency part and high frequency part is half of the signal length of the previous layer. As shown in Figure 1, the method in which the high-frequency components in the original signal are replaced by zeros reconstructs the length of the low-frequency components into the length of the original EGG (Electrogastrogram) signal.

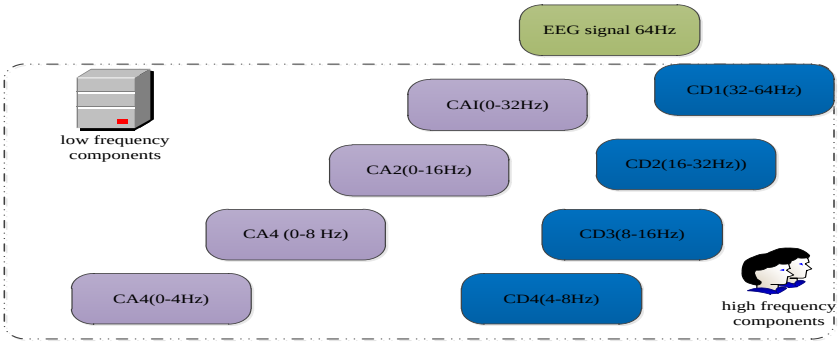

Figure 1: Wavelet analysis principle

(2) Differential entropy

Entropy represents information about source x_i. Shannon entropy successfully represents the entropy of discrete signals [16]. For continuous random variables, Shannon entropy cannot be used directly. Differential entropy approximately defines the value of a continuous random variable. The range of values is divided into small segments of width Δ. According to the mean value theorem, each part is always a x_i, which makes Formula (4) true.

$$\int_{i\Delta}^{(i+1)\Delta} p(x)dx = p(x_i)\Delta \tag{4}$$

Then, each point in the i-th segment is assigned a value of x_i, and the differential formula is used for discrete variables:

$$H\Delta = -\sum_i p(x_i\Delta)\ln(p(x_i)\Delta) = -\sum_u p(x_i) - \sum_i p(x_i)\Delta\ln\Delta \tag{5}$$

As Δ tends to 0, $\sum_i p(x)\Delta$ tends to 1, and $\ln\Delta$ tends to $-\infty$. Therefore, the second term on the far right of the above equation tends to ∞. The first term on the far right in the above formula is defined

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as the entropy of the continuous source, which is called differential entropy. Therefore, the differential entropy can be written as:

$$H(x) = -\int_x f(x)\log(f(x))dx \tag{6}$$

Assuming that the EEG data from the signal source follows a normal distribution $N(\mu, \sigma^2)$, then the differential formula is solved as:

$$H(X) = -\int_{-\infty}^{\infty} \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{(x-u)}{2\sigma^2}} \log(-\int_{-\infty}^{\infty} \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{(x-u)}{2\sigma^2}})dx = \frac{1}{2}\log(2\pi e\sigma^2) \tag{7}$$

As can be seen from the above formula, the differential entropy x_i can only be obtained by knowing σ^2. The mean value of the total copy database signal x_i used is zero. Because the DC component is filtered out, the variance calculation formula is:

$$\hat{\sigma}^2 = \frac{1}{N}\sum_{i=1}^{N} x_i^2 = \frac{P_i}{N} \tag{8}$$

The spectral energy of a discrete signal is usually defined as:

$$p = \int_{-\infty}^{+\infty} f^2(t)dt \tag{9}$$

It can be seen from the above formula that the variance of the EEG signal X_i is its average energy value P. It can be known from Formula (7) that the variance of the EEG signal X_i in the four frequency bands is the average energy value of X_i in each frequency band, that is, $\frac{P_i}{N^2}$. According to Formula (6), the differential characteristic of a given frequency range is:

$$H_i(x) = \frac{1}{2}\log(2\pi e\sigma_i^2) = \frac{1}{2}\log(\frac{2\pi eP_i}{N}) = \frac{1}{2}\log(P_i) + \frac{1}{2}\log(\frac{2\pi e}{N}) \tag{10}$$

It can be seen that when i is the same, the second half of Formula (10) is constant. The derivative of the EEG signal in each frequency band is equal to the logarithm of the frequency band energy in that frequency band.

(3) Fast approximate entropy

Approximate entropy is used to measure the complexity of nonlinear time series. Its value is non-negative, which is good for diagnostics on noisy, short-duration signals. Approximate entropy can be used for both fixed and random signals, as well as for mixed signals that mix deterministic and random components [17].

Step 1: Let the original signal sequence be:

$$\{X_i\} = \{x_1, x_2, ..., x_n\} \tag{11}$$

Step 2: Given a threshold r, a time series of N points is formed into a distance matrix D of size N×N. The element in the i-th row and the j-th column of D is denoted as d_{ij}, then the node distance between the line elements is:

$$d_{ij} = \begin{cases} 0, & |X_i - X_j| < r \\ 1, & |X_i - X_j| \geq r \end{cases} i \in [1, N],\ j \in [1-N] \tag{12}$$

Step 3: The schema dimension m is considered. The original signal sequence forms a continuous

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m-dimensional vector, which is calculated as a similarity score of $C_i^{(m)}(r)$ between m-dimensional patterns at a threshold r:

$$C_i^{(m)}(r) = N^m(i)/(N-m+1) \tag{13}$$

Among them: i≤N-m+1. Using the elements in matrix D, it is convenient to calculate $C_i^{(m)}(r)$ and $C_i^{(m+1)}(r)$:

$$C_i^m(r) = \sum_{j=1}^{N-1} d_{ij} \cap d_{(i+1)(j+1)} \tag{14}$$

$$C_i^{(m+1)}(r) = \sum_{j+1}^{N-1} d_{ij} \cap d_{(i+1)(j+1)} d_{(i+2)(j+2)} \tag{15}$$

Step 4: For the obtained $C_i^{(m)}(r)$, the logarithm and the average of its logarithms are obtained.

$$\phi^{(m)}(r) = (\sum_{i+1}^{N-m+1} C_i^{(m)}(r))/(N-m+1) \tag{16}$$

Step 5: The dimension is changed to m+1. The first four steps are repeated to get $\phi_i^{(m+1)}(r)$ and $C_i^{(m+1)}(r)$, then the estimated entropy can be expressed as:

$$ApEn = (N, m, r) = \lim[\phi^{(m)}(r) - \phi^{(m-1}(r)] \tag{17}$$

This paper compares the values of several thresholds r through experimental analysis. When r=0.1, the estimated entropy difference between the calm state and the stressful state is the largest. Figures 2, 3, and 4 compare the entropy of a, b, and c for the first volunteer's estimated two emotional states.

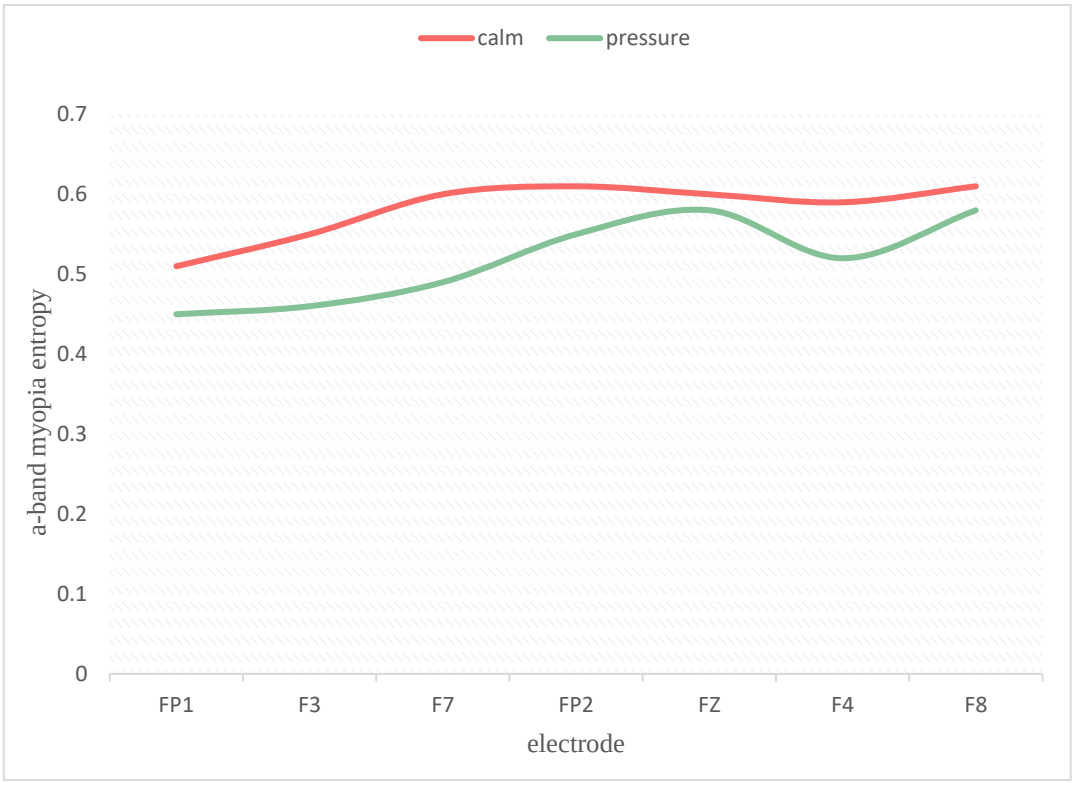

Figure 2: A-band myopia entropy and approximate entropy comparison

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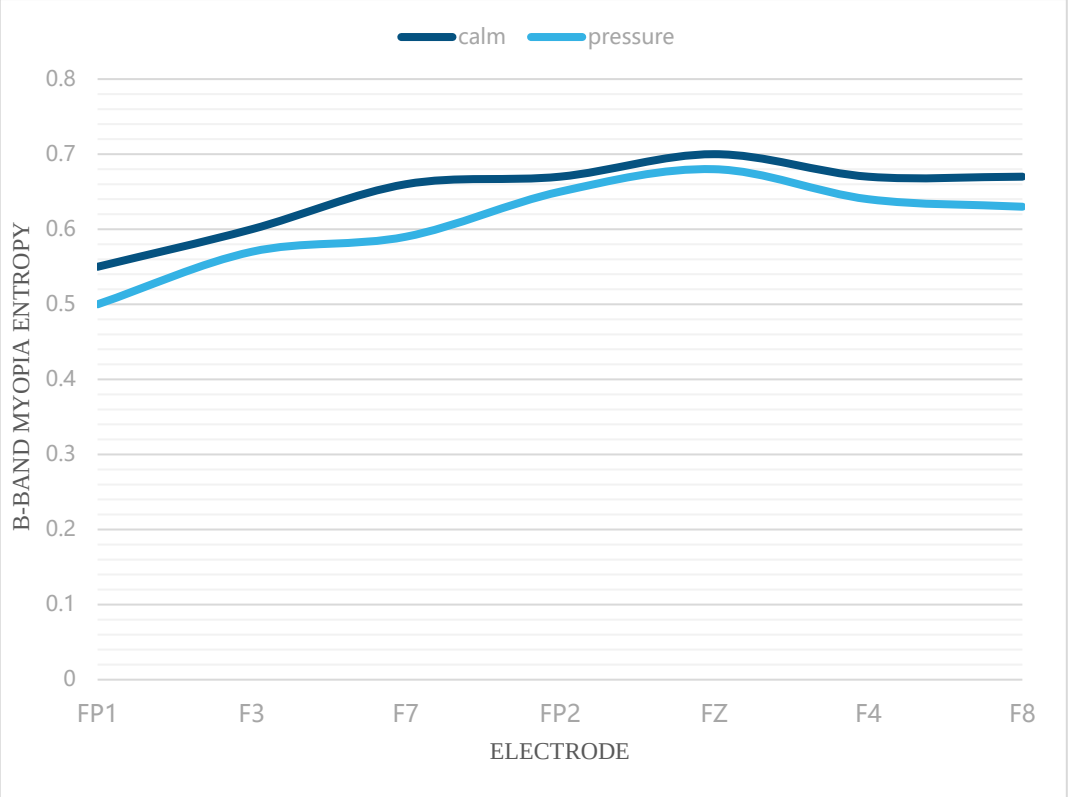

Figure 3: B-band myopia entropy and approximate entropy comparison

Figure 4: C-band myopia entropy and approximate entropy comparison

It can be seen from Figure 2, Figure 3, and Figure 4 that the estimated entropy value of the EEG signal in the calm state is generally higher than that in the stress state. When a person is in a stressful emotional state, the brain is very excited. The conscious that control between neurons in the brain is increased. At this time, the brain is in a more active state of autonomy. The non-linear activity between

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neurons in the brain is weaker. However, when a person is in a calm emotional state, the voltage in the brain is lower. Activity between neurons is relatively random. The non-linear EEG signal increases, so that the whole brain is in a state of non-directional distribution. The EEG sequence is very complex.

3. Elements of Strategies for Responding to Emergency Network Public Opinion Based on Big Data

(1) Emergency characteristics of college Internet public opinion in the era of big data

In the era of big data, college students are highly dependent on new media, and the speed of information acquisition and sharing has been greatly improved. Therefore, college Internet public opinion emergencies also have some new characteristics in the era of big data:

1) The degree of online participation of college students is relatively high. In general, college students are young people, who are full of imagination and passion. They often respond to public opinion for the first time online. However, their way of thinking is not mature enough, who tends to be emotional in their thinking. Their understanding of the problem is also relatively superficial, who is easily confused by false information and thus swayed by negative public opinion on the Internet.

2) The information on the network has rich content and complex data types. College students can see a variety of multimedia network materials based on images, audio, and video on the Internet. Compared with written data, there are more types of such data. The large amount of data makes data crawling and analysis more difficult.

3) Online public opinion in colleges and universities is sudden and extensive. The online information channels of college students are diverse and varied. Therefore, the existence of online public opinion is also a fast dissemination method. There are times when online rumors spread to more university groups and cause collective events in the university.

4) Colleges and universities often have a greater impact when facing emergencies on the Internet. Every step of the university is the focus of social attention. The occurrence of online public opinion incidents not only has a huge impact on the college students themselves, but also has a huge impact on the families behind them. Therefore, the public's opinions on the campus network are handled well, which is an important way to prevent major incidents.

(2) Application of big data in

In the big data environment, the emergency handling of public opinion network emergencies in colleges and universities must carry out real-time monitoring, early warning, correct analysis, and correct decision-making to guide the relationship between the public opinion network and various departments, which solves the crisis of Internet public opinion [18]. Figure 5 shows the big data analysis model of Internet public opinion.

Internet public opinion big data analysis is the use of big data technology to collect, analyze, and process big data to achieve certain values and goals, and to use it in Internet public opinion management. Under a certain system, through the effective coordination and use of massive data resources, the collection, mining and analysis of public opinion data can realize the monitoring, early warning, guidance and supervision of public opinion. Through the network, public opinion information is collected to achieve effective control of emergencies.

First, massive data mining, natural language processing, data mining and other technologies are used to collect and process real and historical data. Second, big data for effective induction is used. In the face of public emergencies, colleges and universities can use big data to conduct online analysis, making it closer to reality, fairer, and more accurate. Finally, big data is used to analyze the reasons for the formation of online public opinion and the handling of various emergencies, so as to further improve the level of emergency management.

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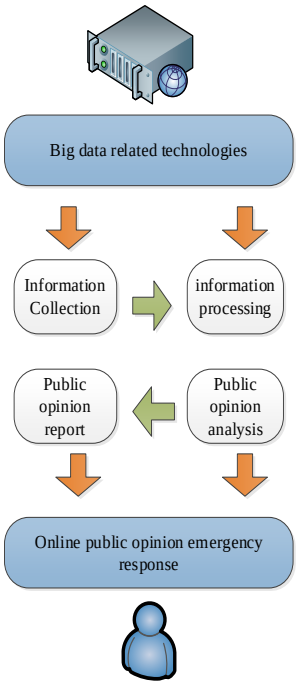

Figure 5: Big data analysis model of online public opinion

(3) Design of college Internet public opinion emergency management information system based on big data

The basic components of the–Internet public opinion emergency management system in colleges and universities in response to Internet public opinion actions include monitoring and analysis systems, guidance decision-making systems, and linkage processing systems [19], as shown in Figure 6.

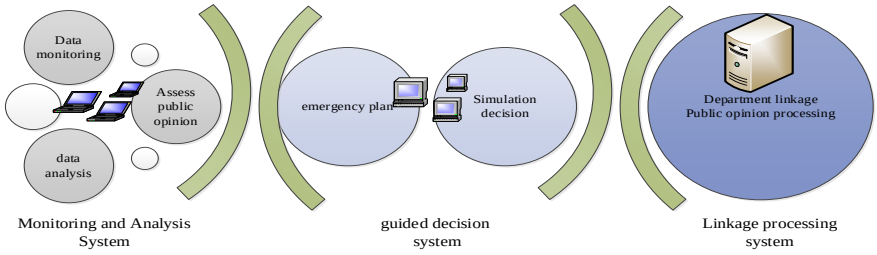

Figure 6: Online public opinion emergency management system

Among them, the monitoring and analysis system is the most basic and the most important emergency management work. In the fields of campus forums, Weibo, WeChat, Zhihu, etc., big data technology is used to collect, analyze, extract topics, predict trends, and warn of important network information inside and outside the campus. By establishing different public opinion evaluation indicators, these evaluation results are converted into information for analysis, which evaluates the occurrence degree of public opinion, thereby effectively preventing the negative impact of further deterioration of Internet public opinion, as shown in Figure 7.

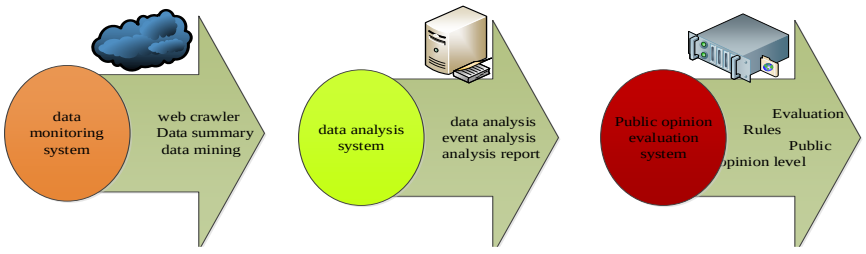

Figure 7: Monitoring and analysis system

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The monitoring and analysis system includes a data monitoring system, a data analysis system, and a public opinion evaluation system [20]. Specific functions include:

1) The data monitoring system uses big data technology to mine and collect massive data and mine public opinion information related to events.

2) The data analysis system conducts in-depth analysis of abnormal data, which actively discovers social hotspots and sensitive topics. The characteristics of the events are compared, which effectively classifies the content view and gives the corresponding analysis results.

3) The public opinion evaluation system determines the level of online public opinion according to the scoring rules. For example, it can be divided into orange, yellow, red, which issue a warning according to the level.

4. Emergency Network Public Opinion and Coping Strategies Using Emotional Feature Extraction Algorithm

(1) Mobile social Internet public opinion information research and analysis institutions, platforms, and research and development software

In recent years, China has established the Internet Information Bureau, which mainly deals with network information and emergencies. At present, the Network Information Working Group, the State Administration of Radio, Film and Television, the Ministry of Public Security, the Ministry of State Security, and the State Security Office have formed a three-in-one network management model of Internet information, Internet industry development and Internet public opinion management through "multi-track co-governance". In recent years, relevant government departments have achieved good results in the analysis of public opinion and the construction of software and hardware. After consulting a large number of documents, the current situation of analysis institutions, public opinion information analysis platforms and market public opinion development software is sorted out, as shown in Table 1.

Table 1: China mobile social Internet public opinion information research and analysis institutions, platforms, research and development software

serial number	University Social Science Public Opinion Research Institution	Media Public Opinion Information Analysis Agency	Mainstream news website public opinion information platform	Social media public opinion information platform	Market public opinion research and development software
1	Institute of Public Opinion, Renmin University of China	People's Internet public opinion Monitoring Office	People's Network	Powerful Nations Forum	Huike Search
2	Tianjin Institute of Social Science and Public Opinion	Xinhuanet Public Opinion Monitoring and Analysis Center	Xinhua net	End of the World Community	Founder E-Government
3	Beijing Jiaotong University Internet public opinion Security Research Center	Global Times Public Opinion Investigation Center	China News Service	Xinhua Development Forum	Torres TRS
4	Public Opinion Information Research Center of Huazhong University of Science and Technology	CCTV Public Opinion Monitoring Center	CCTV International	Kaidi Community	Gone Analysis
5	Center for Media and Public Opinion Investigation, Fudan School	Turing Public Opinion Monitoring Service Platform	China Net	CCTV Revival Forum	Bondfos Software

At present, the analysis of Internet public opinion by government departments mainly focuses on

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monitoring, collecting, analyzing, and finally forming reports. Its goal is to make scientific decisions for the government, and to control and guide them in a timely manner, thereby preventing social crises. Under the guidance of the existing technology, the government Internet public opinion analysis can grasp the overall situation of the in a timely and comprehensive manner, which may lead to the control of the Internet public opinion of the public crisis in its infancy.

(2) Coping strategies - actively promote the disclosure of e-government affairs

Faced with the increasingly complex information on the Internet and the concealment of netizens, how to deal with sudden online public opinion incidents has become an important issue for the government's public management work. The construction of the government portal website can timely and accurately release all kinds of government information. An open electronic government, an open petition system and open government affairs information are established, so as to gradually realize the "transparency" of "government affairs". At the same time, the transparency of government e-government is improving year by year, which ensures that the majority of netizens can participate in government decision-making online and improve the transparency of government behavior, as shown in Table 2.

Table 2: TOP10 ranking of the comprehensive influence of new government media of central state organs

	unit	Interaction Index	Spread Index	Audience Index	growth index	Content Index	Cluster Index	Total Score/%
1	Office of the State Council	81.47	81.94	82.29	80.32	84.27	84.45	82.45
2	Public Security Administration	81.78	80.79	81.41	80.48	84.12	83.19	81.96
3	Central Committee of the Communist Youth League	81.13	80.58	80.14	80.55	82.27	81.12	80.87
4	Supreme People's Court	80.13	80.72	81.19	80.28	81.88	80.63	80.72
5	Supreme People's Procuratorate	80.11	81.09	80.17	80.73	81.55	81.55	80.62
6	National Seismic Network	80.72	79.59	79.74	80.24	80.93	80.69	80.32
7	Ministry of Education	80.12	80.11	80.71	80.12	80.78	79.89	80.29
8	State Administration of Taxation	79.94	80.54	80.33	80.87	80.74	80.02	80.24
9	SASAC	79.62	80.54	79.75	81.26	80.73	80.51	80.4
10	Ministry of Commerce	79.46	79.50	79.87	80.28	80.43	80.23	79.81

Central state organs and various departments have gradually adopted new media as an important carrier. It publishes more than 470,000 pieces of news on the new government news outlet, reaching a cumulative user count of 280 million. Among them, the top ten of the list of the comprehensive influence of the new media of government affairs of the central state organs are listed. In terms of interaction index, communication index, audience index, growth index, etc., the State Council Office ranks first in various indexes, and the comprehensive index reaches 82.45%. The comprehensive performance of the Ministry of Public Security, the Central Committee of the Communist Youth League, the Supreme People's Court and the Supreme People's Procuratorate in the field of new media ranks among the top.

The satisfaction of netizens in the quality of public services at the two ends is analyzed. The specific content is shown in Figure 8.

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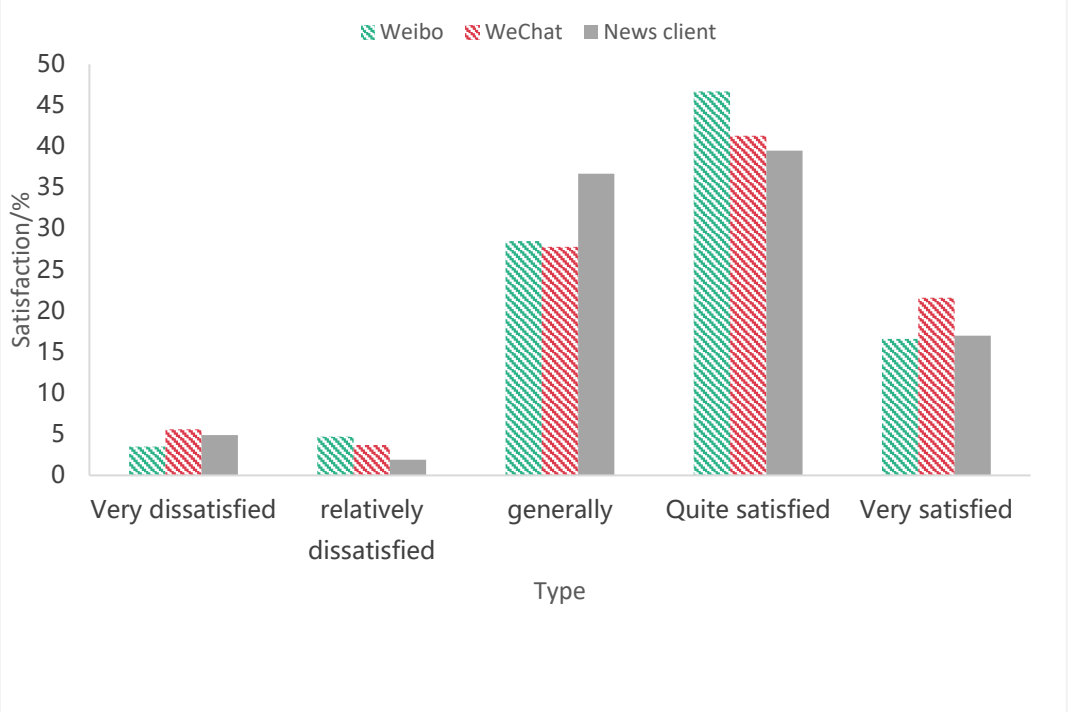

Figure 8: User satisfaction of online government services

At the national level, the concept of "two microblogs at one end (Weibo, WeChat, news client)" is proposed for new government affairs media. The number of online users of public services reaches 239 million, accounting for one third of the total number of Internet users. The quality of public services continues to be recognized by netizens.

As can be seen from Figure 8, 63.3% of Weibo users are very satisfied or somewhat satisfied with online public services. 62.9% of Weibo users are very satisfied or somewhat satisfied with online public services. News customers are very satisfied and relatively satisfied. The number of satisfied users of online public services reaches 56.5%. It can be seen that Weibo has high satisfaction with online public services, which reflects a good working attitude towards public services. The conclusion is that the constructed emergency Internet public opinion analysis and response strategy model research has improved the effectiveness of emergency Internet public opinion by 15.12%.

5. Conclusion

Based on the analysis of the characteristics and coping mechanism of Internet public opinion, this paper put forward the countermeasures for the emergency management of Internet public opinion in colleges and universities by using big data technology, which made it more scientific and reasonable under the data-driven. At the same time, it was proposed to design an information system for emergency management of Internet public opinion in colleges and universities, which could actively and timely discover Internet public opinion. According to the development trend of Internet public opinion, it has issued an early warning, which effectively prevented the development of Internet public opinion in colleges and universities from deteriorating and avoided the occurrence of unexpected events. A total of comparative results were obtained in this experiment. The experimental results showed that the analysis and coping strategies of emergency Internet public opinion based on the emotion feature extraction algorithm could effectively improve the response ability of emergency Internet public opinion.

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