

The function of Big Data technology and social governance in the preservation of cultural assets

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Abstract

The Big Data Strategy underpins the policy of economic development and transformation, emphasising a technical approach to social governance reform. Furthermore, it presents both opportunities and challenges for the government in managing public opinion online. As a result of the swift advancement of mobile internet technology, Chinese individuals have transitioned to utilising the Internet for information acquisition and engagement in social activities. Concurrently, network public sentiment has emerged as a crucial element of public opinion. This essay examines the practical challenges of managing network public sentiment within the framework of big data, informed by the definition of network public sentiment and its influence on governmental governance. The report suggests methods to enhance the state regulation of massive data concerning network public sentiment. The suggested strategies can enhance the safeguarding of cultural heritage.

Keywords: Big data; cultural heritage; cybersecurity; digital artifacts; Internet public sentiment; social governance

Introduction

Internet public sentiment plays a guiding role in local government governance, but it is also easy to confuse the audience and disturb the normal public order (Wang et al., 2018). The ever-changing information technology affects the growth of many fields. Behind big data is a large quantity of online people (Sun et al., 2020). Through information transmission, netizens gather all their opinions to form online public sentiment. While doing a good job in social governance, we should fully understand public sentiment and the potential connection between online public sentiment and social governance (Li & Xie, 2020). The application of big data is expected to innovate the thinking of government governance, and form a brand-new government supervision model through in-depth excavation and analysis of online public sentiment. In order to achieve effective supervision of online public sentiment, local governments need to correctly understand the

existing problems at this stage, find a suitable way to supervise online public sentiment, respect the public's supervision of public sentiment on government departments, and then enhance the credibility of government departments (An, 2019).

In such a brand-new network public sentiment environment, it has become history that the discourse dominance is in the hands of a certain party or an organization (Zhang, 2018). In the Internet age, when dealing with online public sentiment, both the government and enterprises should not only deal with the challenge of the transformation of discourse dominance brought by new technologies, but also think about how to use big data to realize the innovation of online public sentiment governance in data thinking, working mode and technical methods (Guo et al., 2018). The online public sentiment of emergencies driven by big data is characterized by multiple fission of network information, complex public psychology, multiple public sentiments and diverse public participation behaviors. On the basis of introducing the connotation of online public sentiment and its influence on government governance, this article explores the practical dilemma of online public sentiment governance from the perspective of big data, and puts forward that the government's real-time monitoring, analysis and pre-alarm ability of online public sentiment should be effectively improved by establishing and improving the government's online public sentiment big data supervision system.

Big data technology and social governance play a crucial role in the protection of cultural heritage, which is a key component of cultural, historical, and social development. Big data technology allows for collecting and storing a large amount of data about cultural heritage. This process includes archiving digital copies of artifacts, creating databases of historical sites, and collecting information about cultural sites. By analyzing large amounts of data, one can gain new insights and understand the details of cultural heritage. For example, an analysis of relationships between objects or changes in age patterns can reveal new aspects of history and culture (Zhang et al., 2023).

Big data can be used to create accurate 3D models and visualize cultural objects to restore damaged artifacts and monuments. The technology can also create virtual tours and training programs that allow visitors to study cultural heritage, even remotely. This feature contributes to the promotion and education of cultural heritage. Big data systems monitor the state of cultural objects and timely respond to any possible threats, such as destruction or natural disasters (Liu et al., 2022). In addition, social governance promotes public involvement in cultural heritage protection. The public can help gather information, monitor, and promote

restoration.

Technology also allows various organizations and structures to effectively cooperate in the field of cultural heritage protection. Information systems and online platforms can coordinate the practices of preserving and restoring cultural objects. Digital archives provide the availability and preservation of information about cultural heritage for future generations (Zhang & Li, 2019). Overall, big data and social governance preserve and promote cultural heritage, ensuring the accessibility and long-term protection of valuable objects and traditions for modern society and future generations.

Literature review

Overview of the era of big data

Nowadays, Due to the rapid growth of society, the speed of information transmission and information production is much faster than in the past, and the information data shows a spurt of growth, which provides a new form of thinking for the dissemination and collation of data. With the popularization and wide application of cloud computing and intelligent mobile devices, the data generated, processed and flowed on the Internet is also increasing, and an era of large-scale generation, sharing and application of data is slowly opening. The new generation of information technology based on big data of the Internet and the Internet of Things, intelligent terminals and cloud computing has profoundly affected many fields such as economy, society, education, medical care and administration (Wen et al., 2020). The Internet age provides various changes for social production and people's lives, among which major online media provide platforms for the increase of online public sentiment. In recent years, online public sentiment information has exploded, especially the complicated domestic and international situation and tense international situation, which brings more opportunities and challenges to online public sentiment and social governance driven by big data.

Behind big data is a very large quantity of netizens. These netizens spread news quickly with the help of the information network platform, gather opinions in a very short time and then form online public sentiment, and focus on hot events at high times, thus affecting real life and further becoming the fuse of igniting social conflicts and even mass incidents. The information brought by the whole media to all industries is no longer random sampling, but all information data, which can handle more complicated information and data. The huge amount of information data is the basic information component in the growth of all industries, and the information limit can be expanded for data processing.

Overview of network public sentiment and social governance in culture heritage protection

Internet public sentiment refers to the feedback of people's opinions and the expression and dissemination of public sentiment through the Internet. Its main contents include social key news, major social and national events, and people's views and opinions on something or public figures. Under the impact of the wide application of media tools, online public sentiment has gradually become an important part of public sentiment supervision by government departments. However, in order to achieve in-depth analysis and accurate research on online public sentiment, we need to understand the characteristics of online public sentiment and its impact on government governance. Driven by big data, news spreads more and more widely, and the speed is getting faster and faster. Internet public sentiment has a great impact on social governance. People can easily rely on the Internet to focus on a hot event in a short period of time, which is difficult to control and guide the overall public sentiment, thus triggering realistic irrational social events and causing consequences that cannot be ignored. With the advent of the Internet age and the application and popularization of mobile Internet technology, the way of disseminating social news and opinions of the masses has changed in essence, with higher communication efficiency, wider communication scope and greater influence. In addition, due to the relatively low entry threshold of Internet media and its strong interactivity, every resident has the right and means to express and disseminate opinions on the Internet.

Internet public sentiment is a new concept formed in the Internet age, which reflects the collection of most people's opinions. It has many characteristics of the Internet platform and the particularity of public sentiment. Internet public sentiment takes the Internet as the communication carrier, which is a part of public sentiment. Driven by big data, China has formed a large-scale network society, which basically covers all social fields and has a variety of content forms, which has a far-reaching impact on social development and information dissemination. From a certain point of view, the essence of network public sentiment governance lies in the supervision and control of network information, while network social governance is the governance and adjustment of behaviors and social relations expressed through the network. Compared with the traditional media, online public sentiment has a shorter cycle and faster propagation speed in the formation and release of news and events. Relying on the advantages of wide coverage of mobile networks, it has broken through the geographical restrictions of people's information exchange and expanded the spread of online public

sentiment. At the same time, with the growth of Internet technology, there are more ways for the public to release information, more channels for collecting and handling public sentiments, and more frequent interactions between the public and government departments.

Social governance and big data technology raise awareness about cultural heritage protection. It helps preserve and promote the values of the past for modern society and future generations. In addition, social governance and big data technology also broaden and deepen the understanding of cultural heritage. Moreover, due to interactive websites, apps, and social networks, users can personally interact with cultural heritage. They can create tour routes, choose items to explore, and even participate in interactive games related to history. Modern technologies, such as augmented reality (AR) and virtual reality (VR), can transform the perception of cultural heritage. They create immersive experiences where users can directly participate in the story. Communities of internet users can combine their efforts and knowledge to explore, preserve, and promote cultural heritage even on a global level. Through the network, global communities can share ideas and help preserve heritage sites around the world (Jia & Chen, 2020).

Technology provides detailed documentation and records of cultural objects, which are indispensable for their preservation and restoration. These data are especially important for unique objects that may be lost due to time or natural disasters. At the same time, technology makes cultural heritage more accessible to people with disabilities. A video guide with audio access, augmented reality, and other innovations simplify to access historical sites and museums (He & Patnaik, 2018). Overall, social governance and big data technology go beyond preserving and promoting cultural heritage. They also transform the way people interact with cultural heritage, making it more interactive, accessible, and stimulating for everyone.

Materials and methods

Opportunities brought by network public sentiment to social governance driven by big data

The guiding role of network public sentiment and government governance in culture heritage protection

In the current China society, the huge social forces erupted by public sentiment are closely related to the rapid development and wide popularization of information network technology, and this kind of opinion or emotion expressed, spread and collected through information network is network public sentiment (Pouloupoulos

& Wallace, 2022). Public sentiment is also the expression of public sentiment. Through the extensive collection and analysis of data, the government can grasp the overall direction of public sentiment more clearly, thus actively and effectively promoting the process of social democratization. The key to the effectiveness of big data lies in foresight and prediction. Through the collection and analysis of big data, public sentiment monitoring and managers can quickly analyze the degree of concern, development and opinions of netizens, and on this basis, control the trend of events and avoid public crises. For the government, innovative technology can not only form a new way of governance, but also promote the innovation of governance mechanism to a certain extent, and finally comprehensively reform the government governance model.

Driven by big data, the rapid growth of Internet platform has increased the difficulty of information control, resulting in a fragmented form of online public sentiment governance. Internet public sentiment has both advantages and disadvantages. It helps the government to create a communication platform with the masses, which can better express public sentiment, help the masses to exercise their right to participate in and discuss state affairs, and then promote the democratization of social management in China. Internet public sentiment is like a double-edged sword. On the one hand, it can build a bridge between the government and the people, unblock the channels of expressing public sentiment, actively and effectively help the people participate in the discussion of state affairs, and then promote the process of social and political democratization, and supervise the party and the government to continuously improve the level of good governance; On the other hand, it can also incite emergencies through the network, which will affect social stability, undermine social harmony and damage the image of the government, and even use the network to trigger social unrest.

Due to the rapid growth of social networking platforms and e-commerce, the publishers of information and data are not just the government. Many commercial and social platforms and self-media have released a large amount of information or data through the Internet, and different fields have summarized and analyzed the data through the data collection function, and finally released conclusions. In the optimization thinking transformation of network public sentiment and social governance driven by big data, it is mainly divided into two kinds of thinking transformation. One is the transformation of traditional media to solidified thinking. Traditional media has always been the main body of thought dissemination in the development process, and has absolute right to speak to public sentiment. The bias and indoctrination of attitude are the solidification

problems of traditional media. Applying big data to the construction of government network public sentiment supervision system has become a necessary means to improve the level of network public sentiment governance in China, and it is also an inevitable trend to realize the rule of law. At present, if we want to innovate the government network public sentiment governance system, we need to build a big data evaluation system, improve the supervision process of big data network public sentiment, dig and analyze a large amount of network information with big data, accurately evaluate the development trend of network public sentiment, and then improve the supervision ability of government departments and realize the scientific governance of network public sentiment (Xepapadakou & Papalexiou, 2021). Network public sentiment can play a key role in influencing public administration in the field of cultural heritage protection. The main impacts of these sentiments on governance include the following:

1. Public involvement in decision-making. Social networks create opportunities for dialogue between government agencies and the public on important issues of cultural heritage protection. The public can express their opinions and views on strategies for preserving and using heritage.
2. Monitoring and openness. Public opinions expressed on the Internet can serve as an indicator of the most important aspects of cultural heritage protection among the public. Government agencies can use this information to adjust their activities and priorities.
3. Active public initiatives. Due to social networks, public initiatives and associations can effectively coordinate their actions in the protection of cultural heritage. These actions may include collecting signatures, holding actions, and funding projects aimed at restoring and preserving heritage sites.
4. Public pressure and the account of public opinions. Network public sentiment can create public pressure on state bodies and encourage them to take specific measures to protect cultural heritage. Through social media, the public can express their concerns, disagreements, or support for heritage issues.
5. Public awareness and education. Public networks can serve as a platform for educating the public about the significance of cultural heritage. Public authorities may disseminate information and materials about their work and achievements in this field.
6. The monitoring of the public's response to the actions of the authorities. Government agencies can use social media to monitor the public's response to their actions and decisions. This data allows them to quickly respond to

changes in sentiment and consider them in decision-making (Castano et al., 2021).

All the above aspects demonstrate the importance of network public sentiment in the process of developing and implementing strategies and programs for cultural heritage protection. They can be an important tool for improving public administration. As a result, these strategies may ensure greater compliance with the needs and demands of the public in this essential field.

Improve emergency management ability

Network public sentiment monitoring and management are becoming more and more complex and difficult. The government should not only master a lot of data, but also analyze the growth of online public sentiment and its possible impact on the real society. The statistical analysis of big data can find out the relevant connections hidden behind the massive information, and find out the potential connections between various seemingly independent factors, so that public sentiment monitoring people can more accurately predict the development trend of online public sentiment, so as to respond quickly and effectively improve the ability of public sentiment management. Most decision makers of traditional public sentiment governance have insufficient awareness of big data awareness (Konstantakis et al., 2020). Due to the rapid growth of network technology, the amount of data has increased dramatically. Although the government has continuously expanded the information collection path, it has not deeply explored the potential meaning and value behind the information, nor has it paid attention to the utilization value of scattered data in the network. As a result, the online public sentiment governance is still a remedy after it happens, and the public sentiment guidance institutions set up have not played an active role. They only optimized the working mode to a certain extent, and public sentiment governance still depends on people or things, which leads to the government's fatigue in dealing with explosive information.

Popular media promotes the wide dissemination of information, and the trend of personalized communication is particularly obvious. Therefore, extreme views are more easily supported on the Internet, which makes extreme views strengthened and amplified, and aggravates extreme emotions of public sentiment. Driven by big data, all members of society can break the geographical limitations, express their opinions or suggestions anytime and anywhere, and finally form a large amount of data information. In this environment, it is not only necessary for all kinds of organizations to gradually establish a sound service mechanism, improve

service quality, and create new service concepts and methods, but also to do a good job in resolving and guiding public sentiment. In the process of social basic governance, big data network public sentiment can effectively promote the growth of network public domain, and also cause the imbalance of network public domain to some extent. In the process of power governance, it can not only promote the growth of power organization framework, but also have hidden dangers of framework deformation. In terms of authority, online public sentiment may reduce the credibility of the government and bring new opportunities for the consolidation of government authority. The advent of the Internet era has put forward new requirements for fair and orderly competition among different government departments. How to fully improve the enthusiasm of work, conduct performance management and performance appraisal according to law, and reduce the cost of management has become the trend of doing a good job in social governance (Spiliotopoulos et al., 2020).

Results

Optimization path of network public sentiment and social governance driven by big data

Promote innovative research and growth of network technology in culture heritage protection

The traditional public sentiment processing method is no longer applicable to today's social governance. The improvement of network public sentiment and social governance is in a bottleneck period for technological innovation. The development and application of information processing software should be strengthened. The main direction of research and development should be the collection, extraction and analysis of data. The progress of network technology has stimulated the enthusiasm of the public to participate in politics, making the Internet platform a place to express the people's feelings and wishes, and an effective way for the public to supervise the government's behavior. Network public sentiment not only helps to improve the public's democratic consciousness, balance the interests of all social strata, but also helps to improve the efficiency of government work and promote the construction of political democracy. The ability of data collection and analysis has not reached a corresponding level. The government should strengthen its investment in software research and development. Major Internet technology application companies should also strengthen their investment in technology departments for the growth of enterprises. This benefit is long-term.

Driven by big data, Due to the rapid growth of various information means, every

member of society has a microphone in his hand, which can express individual wishes and ideas at any time and anywhere, and form massive data. In such an open environment, all kinds of organizations are required to constantly improve the service mechanism, improve the service quality, optimize the service configuration, innovate the service mode, and do a good job in guiding public sentiment driven by big data (Drakopoulos et al., 2020). In the process of using the Internet to communicate with others, it is easy to have verbal conflicts, and form network public sentiment in a short time, further inducing social conflicts. The dissemination of network information is multi-directional and uncontrollable. Once a bad network public sentiment is formed, such as mutual attack, abuse and slander among netizens, it is easy to lead to network violence, and then affect the orderly network environment. In addition, the Internet itself has a variety of information transmission media. With the increasing quantity of network information, it is easy to have various bad comments. Through the “correlation analysis” of big data, build the network public sentiment database, organically integrate the online data and offline data for sorting and analysis, and deeply explore the deep relationship behind the network public sentiment and social public sentiment appeals, so as to realize the close combination of network public sentiment management and social governance. It can be seen that using big data to manage social public sentiment can identify problems from the huge public sentiment data, effectively allocate resources, and improve the level of social governance. The analysis framework of social management in the big data environment is shown in Figure 1.

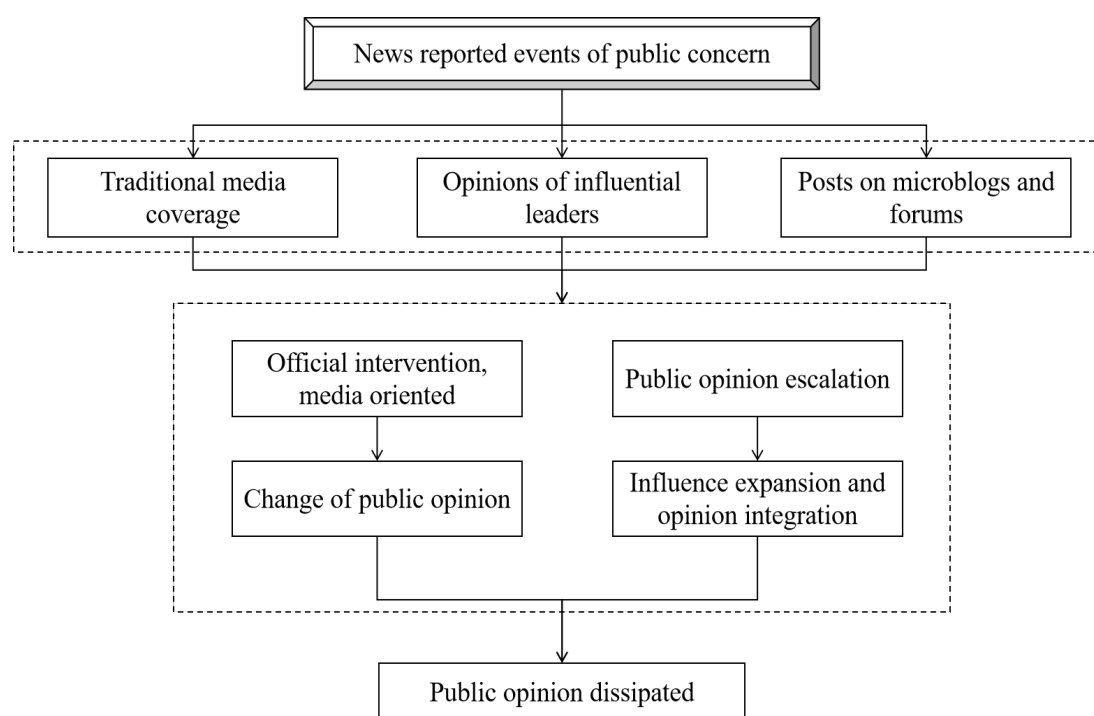


Figure 1. Social management analysis framework

In the growth of online public sentiment driven by big data, the media platform should change its way of thinking and pay more attention to the opinions of online users. Driven by today's big data, the role of the media is more to transmit information and guide public sentiment, and it should uphold a more just attitude towards social information (Levin et al., 2019). The application of big data can realize the active retrieval of massive network information, and government departments can innovate the supervision method of big data, which can capture bad network information more accurately and realize the panoramic grasp of netizens' basic information, so as to accurately manage online public sentiment. The openness of the network environment is relative, and network users can express their personal opinions on the media platform, but the authenticity of information is not guaranteed, which leads to network users sometimes becoming the makers and disseminators of rumors. The government needs to establish a correct attitude towards information processing, make information open and transparent, and focus on ensuring the authenticity of information. In terms of online public sentiment governance, big data, as a brand-new data analysis and processing technology, has become an effective technical path to promote the modernization of online public sentiment governance and a realistic choice for government online public sentiment governance. The application of big data can realize all-round monitoring and management of network information, and give

birth to a brand-new network public sentiment guidance and governance model, which will certainly bring new atmosphere to the government's network public sentiment governance.

If online public opinion information is presented in the form of short text, it is difficult to effectively locate event information, and the information presented is relatively scattered, which is not conducive to accurate expression of events. When public opinion information appears on the internet, it is easy for people to focus their attention on the same topic. At this time, the text content is interrelated. Therefore, based on the time series of the nearest neighbors, a similarity matrix is established. Then, according to the similarity ranking, the text that is most similar to the test text is selected, and based on this local association rule, the correlation between the texts is determined. Using word vector encoding distribution, encode words into a fixed length continuous dense vector with dimensions mainly controlled between 50 and 100, and use real numbers for each dimension. The online public opinion information fundamentally reflects the semantic information, grammar, part of speech, semantic and other characteristic information of words, and controls the dimension of each keyword to 50 dimensions to construct a word vector set. Use a non empty component to represent similarity, and then use association rules to obtain similarity between texts.

$$c_{ij} = \text{vec}_i^k \cdot \text{vec}_j^{k-1}. \quad (1)$$

When all rows in the array are marked as 0, it means that the correlation between the keywords in this row and the short text of the nearest neighbor is relatively small. This proves that this behavior is unrelated to keywords, which is noise. Therefore, by multiplying the weight vector of the main keyword gas with the weight vector of the related topic, irrelevant data information can be filtered, and the main keywords can be retained. Based on this, the weight coefficient of the keywords can be adjusted to enhance the weight coefficient of the main keywords, Eliminating the impact of noise:

$$S_{ij} = \begin{cases} 1, c_{ij} = \max(C[i][n] \geq \lambda) \\ 0, c_{ij} = \max(C[i][n] < \lambda) \end{cases} \quad (2)$$

This article proposes a fuzzy clustering analysis based method based on fuzzy clustering analysis. The characteristics of online public opinion texts are: complex keywords, sparse vocabulary, and difficulty in selecting. If the extracted keywords cannot reflect the essence of the event, it will have a significant impact on the effectiveness of classification. Therefore, it is particularly important to adopt extraction steps that are suitable for the keywords of various texts. This article will

be combined with various types of text to extract information related to time, location, people, and events as keywords for the text. The dividing line in the middle represents a classification line used to distinguish between two types of text. If there are two linear functions between the same text, it is linear separability. Assuming that the subdivision is carried out in a three-dimensional space, the optimal subdivision plane is obtained by aligning the subdivision results with the coordinate system on the same plane.

After using parallel network crawler systems to crawl web data, it is necessary to measure the quality of the data in order to compare the performance of different parallel network crawler systems. Quantitative evaluation of their performance mainly considers two indicators: the overlap rate, which can be expressed as:

$$\frac{(N-I)}{I}. \quad (3)$$

The coverage rate can be expressed as:

$$\frac{I}{U}. \quad (4)$$

Among them, N represents the total number of web pages crawled by all the crawlers used, I represents the remaining number of web pages after filtering out duplicate pages from all the crawled pages, and U represents the number of web pages that can be theoretically calculated according to the system design method and can be crawled by all the crawlers after removing duplicate pages. For the crawler performance experiment involved in this article, the analysis of these two indicators can be as Figure 2 and 3.

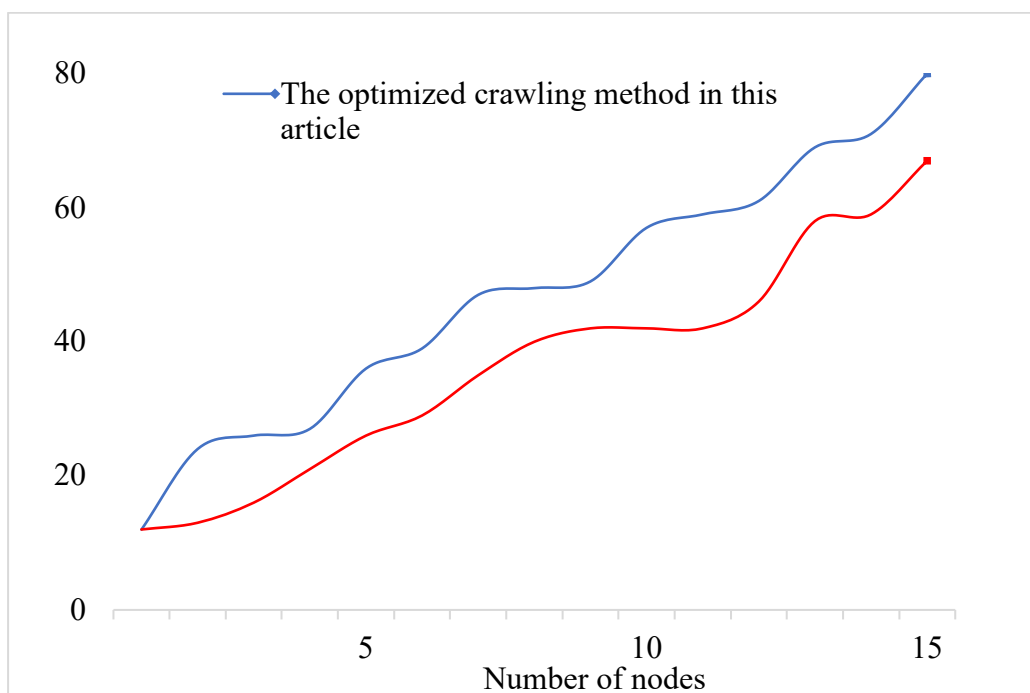


Figure 2. Comparison of acquisition speed for different node numbers

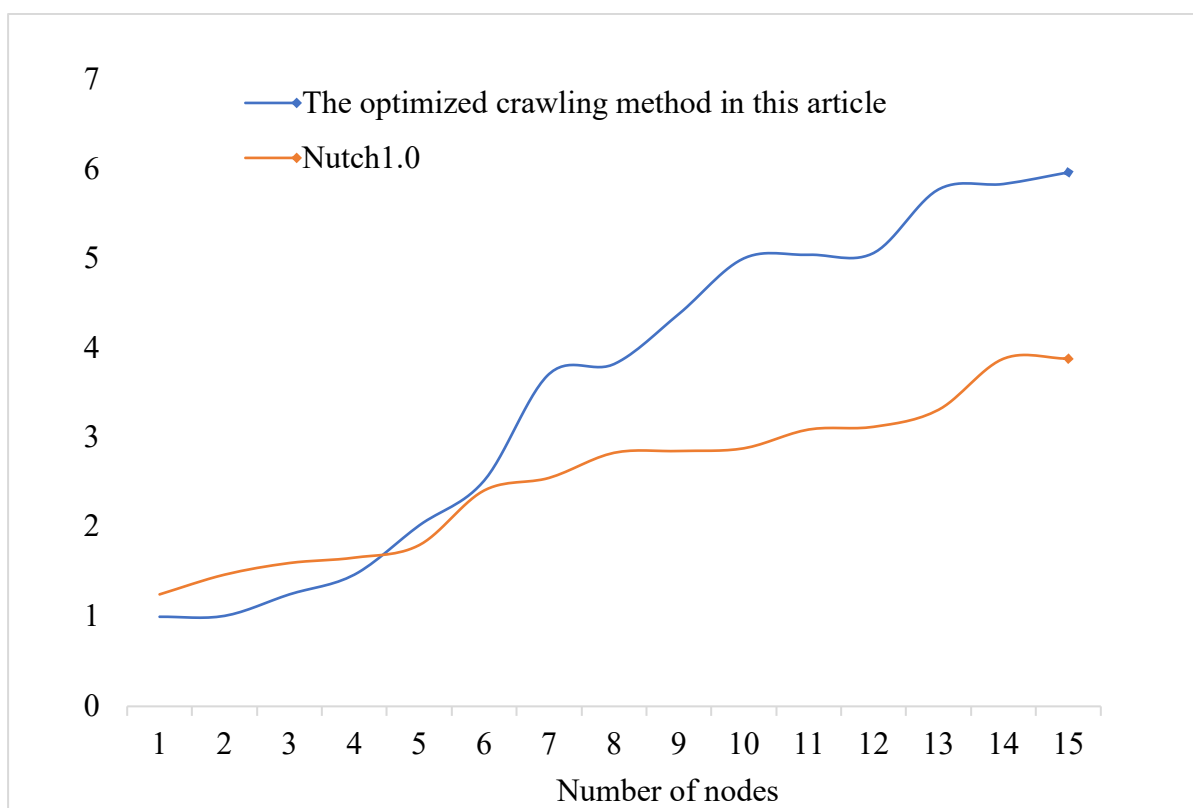


Figure 3. Parallel acquisition acceleration ratio

The experiment shows (as shown in Figures 2 and 3) that a parallel crawling program designed using Mapreduce technology can improve the efficiency of data collection to a certain extent. From the experimental results, it can also be seen that compared to Nutch 1.0, the crawler system used in this article has a higher collection acceleration. However, as the number of nodes increases, the ratio of adding dates for parallel collection by the crawler does not increase proportionally with the number of nodes. The reason for this situation is that when an execution error occurs in a subtask node, the task needs to be re executed, which will cause other subtasks to consume time waiting. If a subtask takes a long time to complete, other nodes need to wait for the subtask to be completed before handing it all over. On this basis, combined with the analysis and application requirements of internet public opinion monitoring, a big data management system for internet public opinion monitoring is constructed. On the one hand, it provides a new approach for the application of big data mining technology in China, which is conducive to the application of big data mining technology in China. On the other hand, it can promote the improvement of the effectiveness of online public opinion monitoring, avoid the loss of valuable historical data assets, and meet the needs of the development of big data for online public opinion monitoring. The data analysis objects, methods, and performance detection standards of major online public opinion monitoring entities are different, which reduces the credibility and effectiveness of online public opinion monitoring results. In response to the issues of low data usage efficiency and unclear standards, it is recommended that the government increase investment in funds, technology, and human resources for big data network public opinion monitoring. The network information department should take the lead in establishing a unified network public opinion big data foundation platform, coordinate the collection, management, and utilization of data from major websites and other network big data sources, and develop unified data interface standards. Online public opinion exhibits the characteristic of generating new words influenced by factors such as time, region, and culture, which makes keyword extraction in online public opinion more difficult. In response to the recognition of new public opinion words, this project plans to introduce quantitative indicators such as information entropy and mutual information, combine the characteristics of new public opinion words with Shannon's law, construct a mining mechanism for new words, and introduce other laws, formulas, and quantitative indicators into the mining of new words, thereby constructing a new and more suitable new word mining method for the Internet.

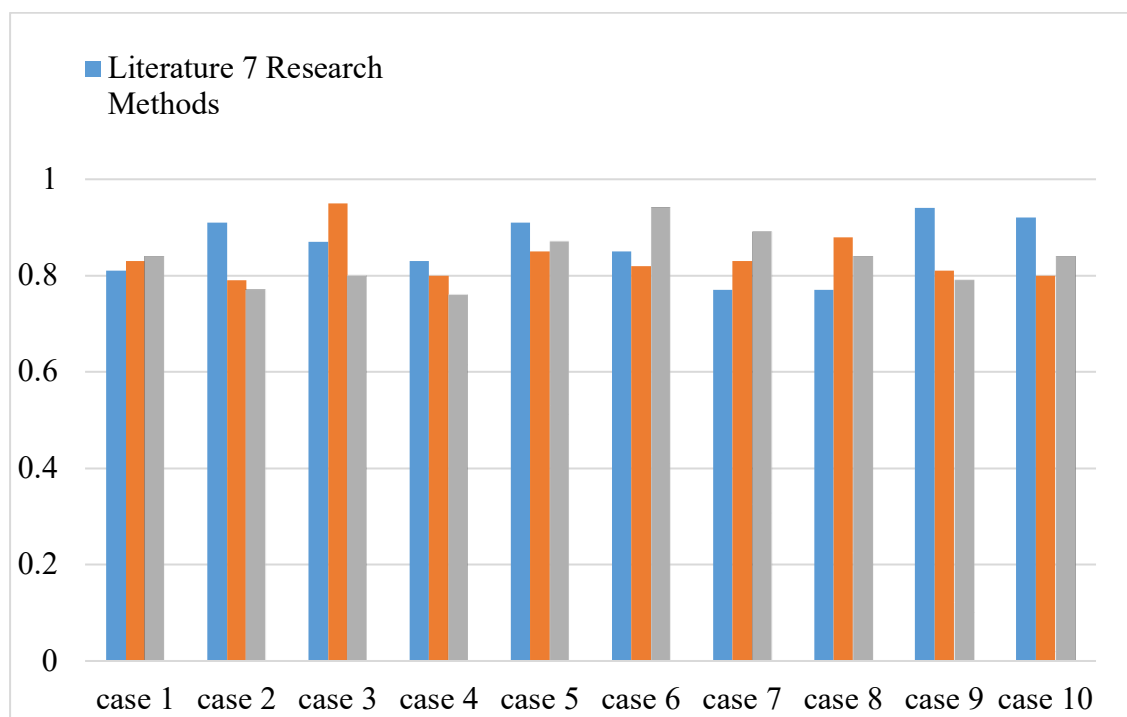


Figure 4. Recall rate values

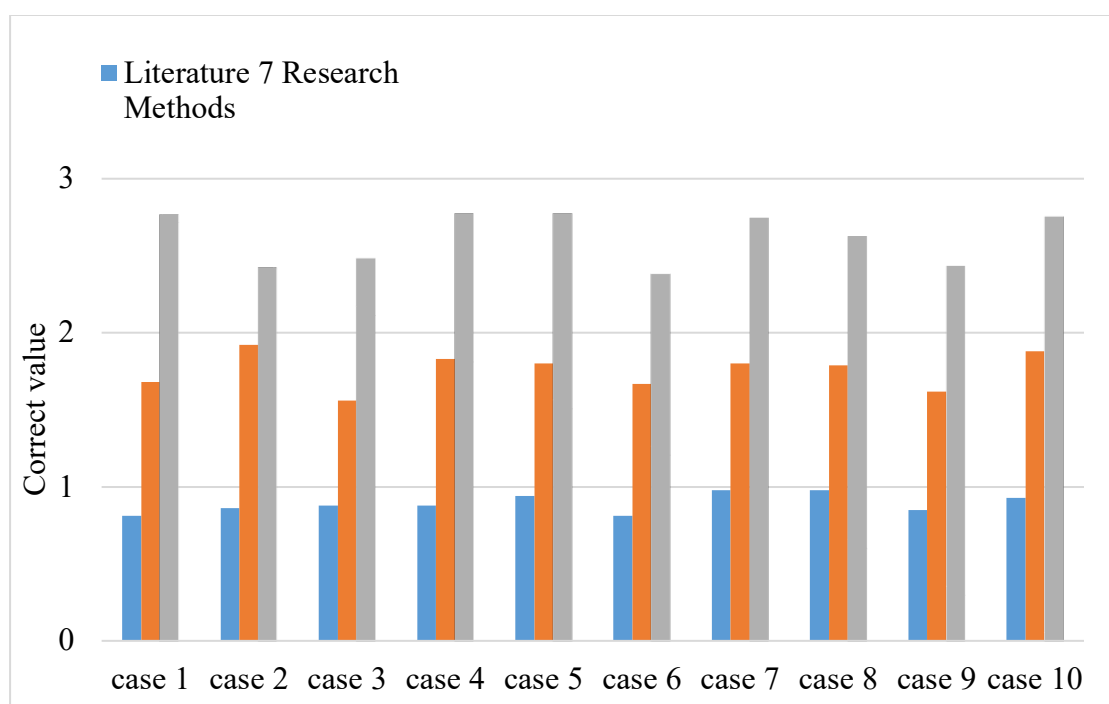


Figure 5. Comparison of the accuracy of three public opinion analysis methods

This classification has better performance than other categories, and all test values are higher than other categories, with an average of over 82% (as show in Figure 4 and Figure 5). This is because these categories have a relatively larger attention group of network users and stronger independence of categories; However, other categories have a higher degree of intersection, which can belong to both cultural and other categories. Therefore, misjudgment is prone to occur during the classification process. Therefore, improving the quality of corpus text is the future research direction of text classification. Secondly, modifying the size of the corpus dataset can also reflect the advantages and disadvantages of the two classification models.

The characteristic of public opinion is that public opinion information will generate new words over time, regions, and cultural contexts, and the emergence of new words makes it difficult to extract keywords from public opinion. The recognition of new words in public opinion information is quantified through information entropy and mutual information. Combining the characteristics of public opinion information and Shannon's law, a mechanism for discovering new words in public opinion is proposed. The next step of research can adopt other laws, formulas, and quantitative indicators to establish a new method more suitable for discovering new words in online public opinion. This article explores and studies popular research directions such as the traditional semantic and sequence information of Aqing based on word vectors, public opinion classification models, public opinion topic classification models, and public opinion classification algorithms. Propose a vector machine network public opinion classification algorithm based on machine learning, and use the nine categories of “social public opinion hot spot analysis” to analyze the semantic aspects of public opinion in word vectors under the same conditions. After analyzing the principles of traditional word vectors, it was found that the information represented by public opinion information has high dimensionality and dispersed word meanings. Starting from a language model, this article uses word vector encoding distribution to extract keywords from network public opinion information, establishes encoding rules between words, and forms a fixed length continuous dense word vector. Analyze the steps of extracting public opinion features, strengthen the influence of relevant feature items in classification, and consider the distribution of features between or within text information. At the same time, this article analyzes the correlation between the real number representation of public opinion information vectors and the features of public opinion information, applies word vectors to the classification and processing of online public opinion texts,

preprocesses online public opinion, and constructs a public opinion keyword extraction algorithm. The research contest in this case covers cultural heritage protection.

The innovative research and development of network technology related to cultural heritage protection is vital for the protection and restoration of valuable cultural values. It can preserve the heritage for future generations and make it more accessible and interactive for modern society (Dimoulas, 2022). These innovations include the development of digital archives, virtual and augmented reality used in immersive heritage research, the use of artificial intelligence to analyze and process heritage data, network platforms for cooperation and information exchange between institutions and researchers, and geographic information systems for convenient mapping and analysis of cultural objects. As a result, cultural heritage becomes more accessible and interesting to the public. This process promotes education and study of history and culture and preserves valuable artifacts and traditions for future generations.

In the modern world, cultural heritage has become an object of special interest, which connects the present and the past. The preservation and protection of valuable cultural assets is becoming an increasingly urgent task, given the rapid development of technology and globalization. Big data opens up new opportunities for preserving, restoring, and spreading this heritage. In turn, social governance and public relations are becoming equally important components of successful cultural heritage protection. The inclusion of citizens in the process of preserving and popularizing cultural values facilitates heritage protection and ensures its accessibility for future generations (Table 1).

Table 1. The role of big data and social governance in the protection of cultural heritage

Aspect	The role of big data	The role of social governance
Data collection and analysis	The collection and processing of large amounts of cultural heritage data, including historical data and archaeological findings.	The organization and direction of public initiatives to preserve cultural heritage and include citizens in the process.

Threat analysis and forecasting	The use of analytical methods to identify potential threats to cultural heritage and anticipate risks.	The implementation of strategies and policies to prevent the destruction and loss of cultural heritage as a result of natural disasters or neglect.
Protection and restoration	The creation of digital copies of artifacts and historical objects for conservation and restoration purposes.	The involvement of the public in joint efforts for the restoration and preservation of cultural heritage sites.
Accessibility and education	Online platforms for accessing digital cultural heritage resources and training programs.	Educational events and campaigns aimed at raising citizens' awareness of cultural heritage.

This table highlights the important aspects of big data and social governance and their complementarity in the context of cultural heritage protection.

Discussion

Improve the network big data management system for culture heritage protection

The advent of the Internet age has undoubtedly brought unprecedented challenges to online public sentiment and social governance. Relevant government departments need to always adhere to their initial intentions, take a positive attitude to meet the challenges, ensure the standardization of network development, and promote the stable progress of the network society. In the growth of the first big data, the government management department needs to improve the big data management system of the network. The main guiding department of network public sentiment and social governance still needs to fall under the macro-control of the government. Network public sentiment is complex and changeable. In the process of social governance, the government needs to pay attention to the management degree of network public sentiment. With the development and

change of the network, it has become an urgent need to try to improve the management system. China first needs to establish a leadership mechanism for internet public opinion supervision in the big data environment. In the big data environment, the monitoring of the Olympic situation presents characteristics of scattered, concentrated, highly volatile, and complex information. Faced with the rapidly changing public opinion data in the big data environment, the government is often submerged in the surging “Olympic information sea”. On this basis, establishing an emergency leadership group in the big data environment can no longer meet the needs of rapid response and seizing the dominant position of public opinion in the big data environment. Big data provides technical support for promoting the modernization, scientificity, and intelligence of public opinion governance, and also brings new opportunities for public opinion governance. However, there are still many difficulties in national strategy, legislative norms, division of rights and responsibilities, technical support, and other aspects. In the era of big data, the government should place national network security at the center, prioritize the healthy development of online public opinion, strengthen the supervision of the party committee and government over online public opinion, and improve top-level design.

The improvement of information technology level caused by big data can certainly improve the information dissemination speed and information utilization value of the network platform, but it also directly hinders the work of network public sentiment monitoring (Zhang, 2019). Judging from the actual situation, the monitoring concept adopted by the relevant government departments in dealing with online public sentiment is still not keeping pace with the times, and it mainly focuses on public security management. When public sentiment erupts on the Internet, it will directly affect the stability of social governance and the stable growth of the country to form timely response policies, control online public sentiment within a controllable range, and avoid people’s dissatisfaction and anger caused by the government’s inaction on public sentiment. From a certain point of view, the credibility of the government in the network determines the effectiveness and efficiency of the network public sentiment governance. When there are mistakes in a policy and a decision taken by a government department, the incident may evolve into multiple information versions in a short time after the attention of all walks of life and the spread of the Internet platform, and even the original real events will show a distorted and misinterpreted posture, resulting in the image of the government department being damaged and the people’s trust in the government declining.

For the correct guidance and control of online public sentiment, it is need to establish a supporting information disclosure system, and fair and just information disclosure can guarantee the stability of the people. In the process of public sentiment guidance, it is need to combine positive guidance with side guidance, and use network media to realize the communication platform between government affairs and the public. In addition, it is need to correctly identify public sentiment. In the process of public sentiment, professional talents of big data can not be ignored. To correctly guide online public sentiment, we must not only understand big data information, but also understand the professional guidance of government affairs attitude talents to promote the orderly conduct of social governance. The application of network public sentiment monitoring system needs a reliable monitoring system, and relevant departments can establish a targeted information monitoring system based on cloud platform and cloud computing, which needs to have various functions such as information collection, information analysis and public sentiment monitoring, so as to ensure that it can provide public sentiment monitoring services for government departments at all levels.

In the era of information technology and globalization, the importance of protecting and preserving cultural heritage is increasingly important. Big data and network technologies can play a key role in ensuring the effective management and preservation of valuable cultural assets. Therefore, there is a need to improve the protection of cultural heritage in the context of public opinion management. In this case, the following methods can be useful:

1. **Information systems for cultural heritage:** The development and implementation of information systems containing data on cultural heritage (for example, historical sites, artifacts, and museums) can be important for their protection. This system should be accessible to the public and include mechanisms to prevent the dissemination of false information.
2. **Cybersecurity and privacy.** The system requires robust cybersecurity measures to protect important cultural heritage data from cyber threats. These measures include encryption, access control, and regular security checks.
3. **Public relations:** Online media can support communication with the public and maintain an open dialogue about cultural heritage. This measure will help in managing public opinion and enable the public to actively participate in the protection and preservation of cultural property.
4. **Big Data:** experts in the field of big data can participate in analyzing public opinion and identifying potential threats to cultural heritage. They can

develop analytical tools based on public sentiment and opinions about heritage protection.

5. **Public opinion monitoring:** Network public sentiment monitoring systems can help in responding to specific issues related to cultural heritage. They can identify trends and influential actors on the Internet.
6. **Protection from disinformation:** For protecting cultural heritage, it is crucial to prevent the spread of false information and combat fakes. Information systems may include mechanisms for verifying the reliability of data and information sources (Rupnik et al., 2020).

Thus, for the successful protection of cultural heritage, there is a need for information systems and technologies to control public opinion. These systems can ensure the stability and support of the public.

Conclusion

Big data has quietly affected our real society. How to keep up with the new situation, quickly respond to new changes, and take new measures correctly? From the perspective of social managers, this is the social governance driven by big data that needs to be seriously considered and actively responded to online public sentiment. A healthy civil society is an important foundation for the country's long-term stability, social unity and harmony, and democratic politics. In a sense, the maturity of modern countries is consistent with the developed degree of civil society. The goal of social governance is to realize the harmonious growth of society and people, and to enhance people's happiness to form a virtuous circle of network public sentiment and social governance. Mutual promotion and common development are the ultimate road to innovation and development. Network public sentiment and social governance is the most effective way of network content management in the new era, which can not only avoid the occurrence of network violence, but also improve the value of network communication platform. If a country wants to achieve long-term stability and harmonious and stable social development, it must maintain the health of civil society. It cannot ignore the influence of online public sentiment driven by big data on social governance. It should rationally use big data thinking to achieve efficient online public sentiment monitoring and timeliness of social governance.

At the same time, in the era of the digital revolution and big data, the protection and preservation of cultural heritage have become even more urgent tasks. The combination of advanced technologies and reliable network data management allows for the effective protection of valuable cultural assets. Cutting-edge

technologies and state-of-the-art approaches to network data management are key to success in this field. Big data offers unlimited opportunities for analyzing, preserving, and restoring cultural heritage. Digital technologies can create exact replicas of artifacts, preserve digital archives, and even restore lost objects of cultural value.

However, new opportunities are accompanied by challenges. Cyber threats and privacy risks become serious problems in this context. Therefore, reliable network data management, including cybersecurity measures and backups, is essential for the sustainability and security of cultural heritage. In addition, public participation and involvement of society in the process of preserving and popularizing cultural values are extremely important. Interactive online platforms where citizens can work together on cultural heritage projects promote a sense of ownership and responsibility to past and future generations. In the period of the digital revolution, the protection and preservation of cultural heritage require a comprehensive approach that combines technological progress, data security, and public participation. As a result, cultural heritage will remain alive and accessible to future generations.

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