



Current Research on Public Opinion Control and Emergency Response : A citespace-based Knowledge Graph Analysis

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Abstract

Background/Objective: With more ways and platforms for people's voices, timely guidance and proper handling of public opinion are increasingly important for social development. Methods/Statistical analysis: To investigate the current status of research on public opinion control and emergency response, the article uses the web of science database as the research object and analyzes the collected literature for co-citation network and keyword co-occurrence network with the help of citespace software, and constructs a knowledge graph. Findings: Research on public opinion control and emergency response shows both concentrated and decentralized development in terms of publishing journals and countries/regions, with the United States, the United Kingdom, and China as the main countries. Research hotspots in recent years are mainly in social media, law, and emergencies, which is a research involving multidisciplinary fields. Improvement/Application: Public opinion control and emergency response have more research space in social media, legal protection, and emergency events.

Index Terms

Citespace, Public opinion, web of science, knowledge graph.

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I. INTRODUCTION

With the development of science and technology and the continuous improvement of people's living standards, people have more and more ways and platforms to voice their opinions, so the timely guidance and proper handling of public opinion should also be deeply implemented into the governance of local governments. The outbreak of unconventional emergencies will drive the spread of public opinion information [1] timely and proper guidance of public opinion has a great impact on the credibility of the government, especially the credibility of local governments. Untimely and inappropriate crisis response can easily cause negative online public opinion [2], and timely and proper handling of public opinion on emergency public events can minimize the damage and have an important impact on social stability and people's happiness at critical moments, and the spread pattern and development dynamics of negative emotions of social media users in the era of self-media are significant for the government's influence in controlling public opinion and guiding public opinion, and the government's timely The government's timely guidance of public opinion can play a good role in controlling the development of public opinion [3].

By studying the information contained in the literature, it helps scholars to comprehensively understand the hot spots and trends in the research field, find new research entry points and research directions, and promote academic development [4]. For example, Yu Guoming concluded that the political tension in Chinese society is at a high level, and there is an urgent need to build a social "safety valve" mechanism and a spiritual soothing mechanism for the public [5]. Yang Rui-duan proposed a method and system for online public opinion information statistics: input the topic to be counted; crawl the data related to the topic from web pages and microblogs through web crawlers and save them; generate statistical data from the crawled data; generate statistical reports based on the statistical data [6]; second, analyze the data through other literature analysis tools, such as Vosviewer and Ucinet by Cui Xueli et al. For example, Cui Xueli et al. used Vosviewer and Ucinet software to visualize and analyze the literature data, which can reveal the current research status of major emergencies in China [7].

Different from the above studies, this paper uses citespace software to study the knowledge graphing of existing literature. Compared with simple descriptive analysis, knowledge graphing can evaluate and predict the current situation and development trend of a research field by various quantitative characteristics of literature, using

mathematical and statistical methods, and show the interrelationship between information through spatial patterns to show the development history and structural relationship of knowledge [8]. In addition, publisherperis software can only perform simple analysis of literature citations, literature and journal impact factors, and vosviewer, although it can generate knowledge graphs similar to citespace, is unable to view node information and has difficulty extracting key information after clustering, while citespace can provide a variety of relationship matrices to show complex The citespace is able to provide a variety of relationship matrices to display complex data feature relationships, and also has powerful pivot functions that help to quickly and intuitively grasp the characteristics and general trends of the research domain [9-10].

Since relevant research in this field has emerged only in recent years with the development of big data, the existing review studies are inadequate in terms of research methods and data selection, and the overall research lacks systematization and comprehensiveness, and few articles have summarized the development lineage. This paper uses citespace-based knowledge graphing analysis to explore the current research status of public opinion control and emergency response. By summarizing the current spatial and temporal distribution, disciplinary fields and journal distribution, as well as research hotspots and frontiers, we found that relevant research is mainly concentrated in five countries, including the United States, the United Kingdom, China, Canada and Australia, and involves multidisciplinary fields and research hotspots in publicopinion, attitude, opinion, policy, and so on. Based on the above results, we propose corresponding suggestions for future research directions at the end of the paper.

II. DATA SOURCES AND RESEARCH METHODS

A. Data sources

The main data of this paper were obtained from the web of science (WOS) database, and the literature search was conducted with "Topic = (Public opinion control OR Public opinion emergency), time span: all years". A total of 3020 relevant documents were retrieved from the literature search. Since this paper focuses on the issues of public opinion control and public opinion emergency, 2821 documents were obtained by filtering and deleting irrelevant documents such as volume headings and book reviews, and downloading the abstracts, authors, keywords, references and other related information to obtain the data required for analysis.

B. Research Methodology

Firstly, WOS search analysis tool was used to statistically analyze the time distribution, spatial distribution, subject area distribution and literature journal distribution in the field of opinion control and emergency response; secondly, WOS data analysis board of citespace was used to visualize the country, journal, keywords and reference of the sample literature. Secondly, the WOS data analysis board was used to analyze the country, journal, keywords, and reference of the sample literature, so as to analyze and summarize the hotspots and frontier research in the field. The analysis of the above-mentioned research hotspots and frontier research is mainly measured by centrality. In citespace, centrality is measured by between centrality, which is used to measure the importance of nodes in the network (there are also metrics to measure the importance of nodes such as degree centrality and proximity centrality). The formula for calculating centrality is as follows.

$$BC_i = \sum_{s \neq i \neq t} \frac{n_{st}^i}{g_{st}}$$

where g_{st} is the number of shortest paths from node s to node t , and n_{st}^i is the number of shortest paths through node i among the shortest paths g_{st} from node s to node t . From the perspective of information transmission, the higher the centrality, the greater the importance of the node, so the literature with high centrality (or country, keyword, etc.) is usually a key hub connecting two different nodes, which can reflect the hotspot and frontier of the research field.

III. RESEARCH RESULTS AND ANALYSIS OF PUBLIC OPINION CONTROL AND EMERGENCY RESPONSE

A. Figures and Tables Spatial and temporal distribution statistics

The temporal distribution can reflect the development process of the field by analyzing the growth and decay of the number of relevant literature publications, and the spatial distribution can help researchers clarify the countries and regions leading the research in the field, and the statistical analysis of the temporal distribution can provide a more comprehensive understanding of the development status of the research.

1. *Time distribution* The changes in the quantity of literature can directly reflect the development of the subject area, and the statistical analysis of the growth and decay of literature publication can help to

understand the development process of public opinion control and public opinion emergency. The time of publication of the relevant literature quantity is counted and its time distribution is plotted in a line graph (as Figure. 1.)

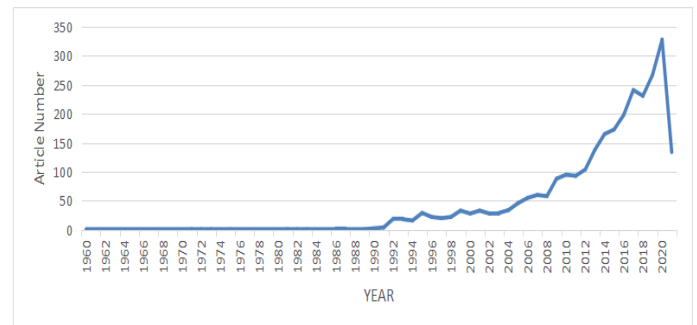


Fig. 1. Annual publication volume.

From Figure 1, we can see that the earliest literature was published in the 1960s, and the Internet was officially started in the 1960s, and it is worth noting that we can also see that the published literature started to rise year by year after 1990, which is a very critical point in time, because the popularity of personal computers was exactly in the 1980s and 1990s, and people's opinion dissemination was growing exponentially with the addition of the Internet. With the rise of Internet technology, more and more people began to use the Internet to discuss hot topics of events, and the role of the Internet in generating public opinion gradually increased [11]. The number of papers on public opinion control and emergency response started to increase dramatically around 2008 and has been rising year by year, as the global financial crisis and natural disasters have led governments to pay closer attention to public opinion since 2008. The number of papers started to rise slightly after 2016, mainly due to the change of the U.S. president and the adoption of a series of "withdrawal", reverse globalization, trade wars and other actions, which led to a new climax in the development of worldwide public opinion. It is worth mentioning that there is a steep increase in papers about public opinion control and public opinion emergency from the beginning of 2020 to 2021, and the related event of new coronavirus spreading globally worldwide as shown in Figure 2 has triggered a series of political, economic, and ideological crises, and the corresponding hotspots of public opinion control and emergency have begun to focus significantly on related fields. 2021 As of 2021 July, as many as 34 articles related to public opinion control and public opinion emergency response related to the New Crown epidemic have been published, more than the number of articles published in the whole year of 2020, which to a certain extent illustrates the worldwide influence of

this New Crown epidemic.

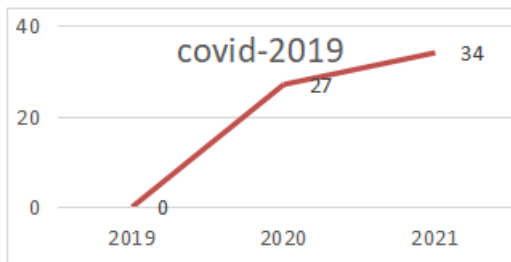


Fig. 2. Articles related to covid-2019.

2. *Spatial Distribution* Use citespace to visually analyze the number of published papers on opinion control and opinion emergency in each country and region, set the TimeSlicing interval to 1 year, and select "Country" in the "NodeTypes" panel. In the "NodeTypes" panel, select the "Country" option to run the analysis. The results are shown in Figure 3, in which there are numerous nodes and links, among which the United States has the largest centrality and has direct or indirect cooperation with the United Kingdom, Canada, Australia and other countries, followed by the United Kingdom and China, while China has relatively less cooperation with other countries compared to other countries.

The results of the visual analysis were further analyzed to plot the spatial distribution of the papers published, as shown in Figure 4 and Figure 5. From the figure, it can be seen that, in the sample literature, from the perspective of publication volume, the United States and the United Kingdom, China, Canada, and Australia are in the top, with their publication volumes of 1281, 279, 215, 203, and 163, respectively, while the cumulative share reaches 58.5% of the total share, which is at the relatively leading level of research in this field; from the perspective of key nodes (centrality > 0.1), the The top three countries are the U.S., the U.K. and Canada, with 0.36, 0.21 and 0.16 respectively. the U.S., as the world's top developed country in terms of economic volume, has the most complex population and the most diverse culture in the world, and thus ranks first in the world in terms of research on public opinion control and public opinion response. In contrast, the centrality of China's literature is only 0.04 despite its top ranking in terms of the number of literature, which is fundamentally related to the difference in political system, ideology and historical development of China and other countries. China has a 5000-year history and a deep cultural heritage with its own unique way of handling public opinion. Since the pre-Qin Dynasty, it has emphasized the priority of order, value and rationality, and moralization, which are very different from the Western ideology of freedom and concern for the present. Therefore, the research on public opinion control and emergency response is quite different.

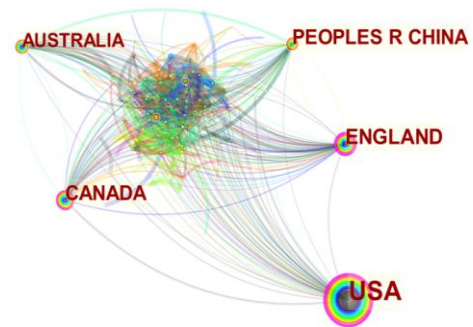


Fig. 3. Major issuing countries.

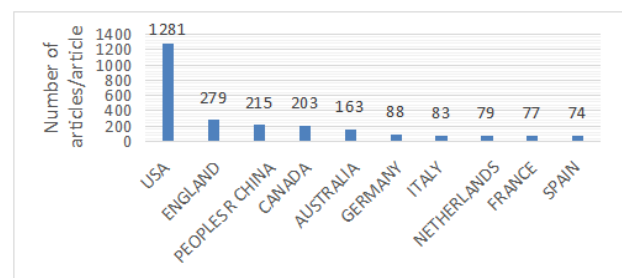


Fig. 4. Top 10 countries in terms of number of articles published.

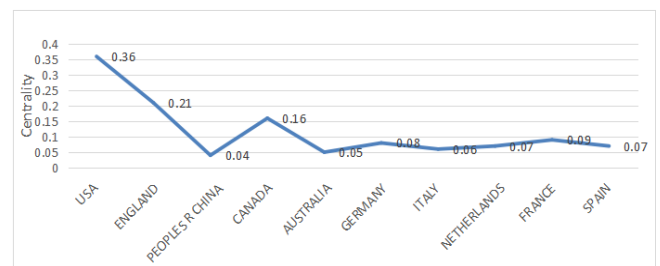


Fig. 5. High centrality country distribution map.

B. Statistics on the distribution of academic fields and journals

The distribution of academic fields and journals can reflect the relevant disciplines and focuses involved in the research content of the field, and statistical analysis can clarify the key disciplines and core journals involved in public opinion control and public opinion emergency.

1. *Subject Area Analysis* The subject area distribution was statistically mapped according to the WOS search analysis tool, as shown in Figure 6. The largest number of documents were distributed in the Environmental Sciences and Ecology category; followed by Business Economics and Health Care and Social Sciences. In addition, psychology, medicine, science and technology, computer science, and policy and international relations are other subject areas with more categories in the distribution

chart. Thus, it is clear that public opinion response and control is not only a unilateral management discipline, but also an interdisciplinary and comprehensive discipline that integrates sociology, computer software, psychology and other knowledge and technology tools.

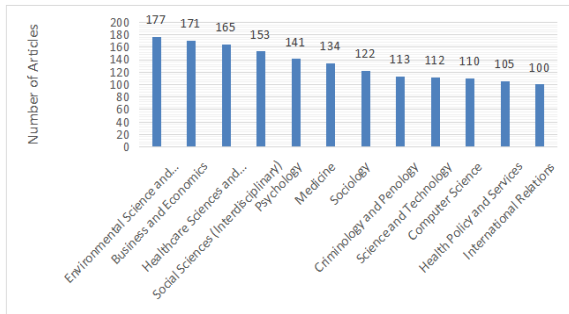


Fig. 6. Subject Area.

2. *Distribution of issuing institutions* The statistical analysis of the issuing institutions of 2821 papers can reveal the level of the source institutions in the field and the closeness of the cooperative relationship between institutions.

Which can be seen that the cooperation among institutions is also very close and will be strengthened in the future to collide with new sparks. From the size of the node circles and fonts in the figure, we can see that the most important research institutions in the world for opinion control and public opinion response are Harvard University and Washington University. In order to show the important international related research institutions more clearly, I have drawn Table 1 with the help of relevant data in CiteSpace, listing the top 13 institutions with more publications in core journals. Most of the institutions in the table are comprehensive institutions, among which the universities with the highest academic ranking in the world are the most prominent, and most of them are American universities, which shows the importance of the United States in public opinion; in terms of publication time, Harvard University and the University of North Carolina are the earliest, and these two universities also lead the relevant research later.

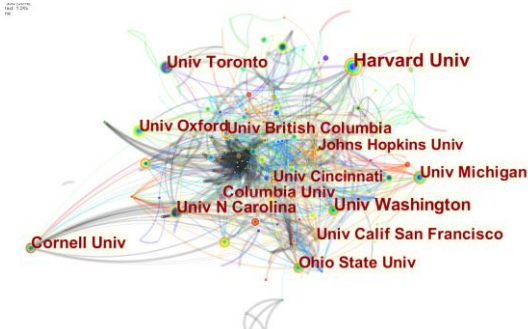


Fig. 7. Distribution of issuing institutions.

Table 1. NUMBER OF INSTITUTIONAL ISSUANCES

Number of articles issued	Issuance start time	Institution
42	1998	Harvard Univ
32	2005	Univ Washington
25	2003	Univ Toronto
25	1998	Univ N Carolina
25	1999	Columbia Univ
25	2001	Cornell Univ
23	2007	Univ Michigan
23	2000	Univ Calif San Francisco
22	2005	Univ British Columbia
21	2001	Ohio State Univ
21	2010	Univ Oxford
20	1999	Univ Cincinnati
20	1999	Johns Hopkins Univ

IV. RESEARCH HOTSPOTS AND FRONTIER ANALYSIS

A. Analysis of research hotspots

Keywords are a high level summary of the article's thematic content, and analyzing keywords can capture the hotspots in that research area and also help us to capture potential thematic changes through this variation in buzzwords [12]. The keywords were analyzed using CiteSpace and 15 high frequency hotspots were obtained. (As shown in Figure 8)



Fig. 8. High Frequency Hot Keywords.

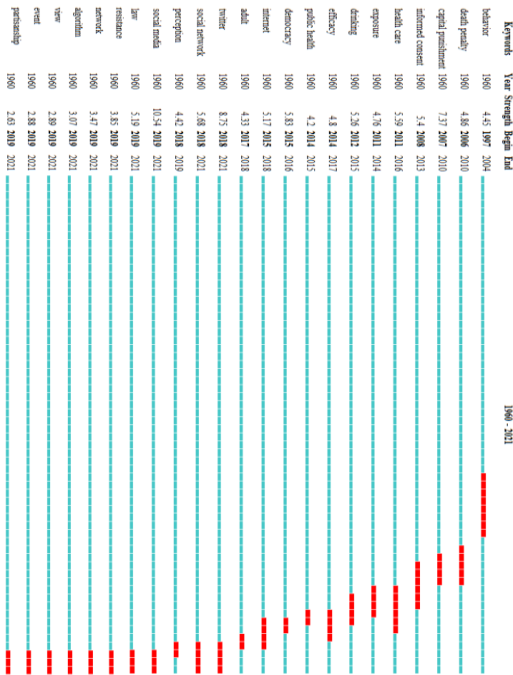


Fig. 9. Top Keywords with the Strongest Citation Bursts.

The frequency of a keyword reflects the degree of attention paid to the node by scholars, and the centrality of a keyword measures the pivotal role of the node within the research domain, and the frequency of keywords in the knowledge graph is ranked and summarized (see Table 2).

Table 2. KEYWORD FREQUENCY RANKING SUMMARY

Ranking	Quantity	Keywords
1	613	public opinion
2	345	attitude
3	196	opinion
4	178	policy
5	170	impact
6	148	perception
7	137	support
8	127	health
9	120	politics
10	118	united states
11	93	media
12	91	management
13	89	model
14	89	public health
15	89	information
16	85	risk
17	85	behavior
18	75	race
19	75	knowledge

20	73	preference
21	65	social media
22	63	communication
23	61	covid-19
24	56	crime
25	54	smoking
26	52	trust
27	51	care
28	46	democracy

Combing Table 2 and Figure 7, considering the frequency of keywords and the hotness of keywords as well as the attribute characteristics of keywords, and selecting keywords with higher frequency and hotness, we can conclude the main hot spots of current research on public opinion emergency and opinion control.

In the study of social media for opinion control and public opinion response (social media), this keyword has the highest heat of 10.54 and the frequency of 65, which is an emerging hot spot in the field of opinion control and public opinion response, and the heat of Twitter is 8.75 in Figure 9. J Aguilar and O Terán, et al. as early as 2015, used "agenda setting" and "prototypes/framing" (prototypes/framing") to describe the psychological impact of media bias and manipulation, and their influence on public opinion [13]. And X Han, Wang J , Zhang M et al. explored public opinion in the early stages of COVID-19 in China by analyzing the Sina-Weibo (a Twitter-like microblogging system in China) texts in terms of space, time and content. The temporal variation and spatial distribution of COVID-19-related microblog texts were analyzed. A topic extraction and classification model was developed based on the latent Dirichlet allocation model and the random forest algorithm [14].Gu Y , Zhang B et al. constructed a new opinion evolution model based on the Weisbuch-Deffuant opinion evolution model, considered the important parameters of common friends among individuals, combined with actual interactions and conducted simulation experiments. The experimental results show that the trust threshold is inversely proportional to the evolution of the final opinion view [15].

The study of law in opinion control and opinion response (law), a keyword with a hotness of 5.19, is not a top-ranked keyword, but is closely related to the high-frequency keywords of politics, policy, crime, and democracy. And Leiserowitz A in 2006 used the theoretical distinction between analytical and empirical decision making and found that risk perception and policy support of Americans are strongly influenced by empirical factors including emotions, imagery and values [16].U The, Journals,

S Yakubov et al. proposed a new modern concept for improving the effectiveness of citizen control "E-citizen control" is based on observation, generalization and axiomatization methods, following public oversight and further strengthening it by studying the existing legal framework and its practical implementation [17].

The study of public opinion control and public opinion emergency of sudden events (EVENT), this keyword has a hotness of 2.88 but has a global outbreak of COVID-19 (word frequency 66), public health (word frequency 89), health (word frequency 127), risk (word frequency 85), and impact (word frequency 170) related to COVID-19 in recent years. Zhang Y, Chen J, Liu B et al. proposed a new word structure discovery scheme and Chinese sentiment analysis method based on the temporal explosion of online topics for the COVID-19 public opinion environment. A "Scrapy-Redis-Bloomfilter" distributed crawler framework is built to collect data. A large national survey was conducted by Haeder S F et al. to assess American attitudes toward three educational settings (day care, K-12 school, and college) and vaccination requirements specific to COVID-19. and concluded that partisanship, gender, race, ruralness, and perceptions of the appropriate role schools should play in providing health services were important predictors of public opinion [19].

In addition, there are some keywords with high frequency and high heat that need our attention, such as migration, public participation, simulation, perception, algorithm, and partisanship. The consequences of the outbreak of public opinion on refugee migration in Germany, for example, are worthy of our consideration, and perception appears more frequently and is relatively hot. It is important to understand the role of algorithm in machine learning and deep learning to improve insight. Partisanship has been the focus of discussion in Western countries, so it is also important to do a good research in this area.

V. CONCLUSION AND OUTLOOK

A. Research findings

Using CiteSpace software, this paper analyzes and visualizes the literature and related data on public opinion control and public opinion emergency from 1960-2021 in the WOS database at different levels, and draws the following conclusions.

In terms of time distribution, the relevant literature on public opinion control and public opinion emergency first started in 1960, and then more than 60 years long in 2021, which has a great development. With the development of science and technology and social progress, public opinion emergency and control have gradually penetrated into all aspects of modern society and made

guarantees for social stability and economic development, but with the development and progress of society, more and more aspects need the guarantee of public opinion control and public opinion emergency, so there is still a lot of space for the development of public opinion control and public opinion emergency.

In terms of the distribution of countries and regions at the forefront of research on public opinion control and public opinion emergency, China is currently among the world leaders in the number of publications in this field, but its centrality is low, and it lacks in-depth communication with other countries in the world in the field of public opinion control and public opinion emergency, and its influence in the field of public opinion control and public opinion emergency in the world is low.

In terms of subject areas and journal distribution, the core journals of public opinion control and public opinion emergency research at this stage include environmental science and ecology, business economics, health care and social science, etc. The research content tends to be multidisciplinary and the research objects tend to be diversified.

A visual analysis of applied research in the field of opinion control and public opinion response reveals that the hotspots in this research area mainly include opinion control and public opinion response in social media, the application of law in opinion control and public opinion response, and opinion control and public opinion response in emergencies, while hotspots such as immigration, public participation, simulation, insight, algorithms, and partisan struggle are also noteworthy.

In conclusion, the study can promote the improvement of national public opinion control and public opinion emergency response capability, improve the efficiency of public opinion control and public opinion response, and promote the stable, healthy and rapid development of social, political and economic affairs.

B. Outlook

With the development of technology in society, the control and emergency response to public opinion has also received more and more attention from scholars. Through the analysis of the whole text, although the research in this field has entered a rapid development stage, there are still some hot issues to be further explored. 1) Methods of public opinion control and public opinion emergency response in social media social networks should be further explored to adapt to the public opinion problems in the fast developing social networks 2) The influence of laws in public opinion control and public opinion emergency response should be improved, the legal system should be perfected, the effectiveness of laws

should be improved, the legal gap should be reduced, so that public opinion control and public opinion emergency response can be based on laws and the public opinion crisis can be killed in the cradle 3) New technologies should be further explored Development and application. With the development of society and the intensification of environmental problems, the ability of controlling and responding to public opinion about events has become more and more the focus of the government in controlling and responding to public opinion, and the uncertainty of social development and environmental problems also makes us invest more energy to improve the ability of controlling and responding to public opinion in these aspects, so improving the ability of controlling and responding to public opinion about social and environmental problems is also the trend of future research. Therefore, enhancing public opinion control and emergency response capabilities for social and environmental issues is also a future research trend.

REFERENCES

- [1] Zhang Z, X. , Hao W, H. , & Zhang, E, S. . (2020). A study on scenario projection of emergency events driven by online public opinion. *Intelligence Science*, 38(5), 7.
- [2] Zhang, W. . (2020). Research on public health emergencies and public opinion response discourse in governmental new media: An example of the New Crown Pneumonia outbreak. *Journal of Jianghai Studies* (2).
- [3] Zhang, Y, M. , He, X. , Du, C, C. , Su, Y, Y. . (2020). Research on iesr model of group emotion transmission among internet users under the cumulative effect of negative emotion. *Intelligence Science*, v.38;No.350(10), 31-36.
- [4] Liu, Y. , Wang, Z, R. , & Qian, K. . (2019). The evolution and emerging trends of green supply chain research in China - A citespace visual analysis based on cssci literature. *Science and Technology Management Research*, v.39;No.439(21), 207-214.
- [5] Yu, G, M. . (2010). Characteristics and statistical analysis of hot events of Internet public opinion. *People's Tribune: Midterm Journal* (4), 24-26.
- [6] Yang, R, C. . (2013). Method and system of online public opinion information statistics. *CNI02968452A*.
- [7] Cui, X, L. . (2020). Research Status and Insights on Major Emergencies in China - Based on Bibliometric and Visual Analysis. *Contemporary Economics*, No.515(11), 120-123.
- [8] Shu, Y, Y. , Li, H, F. , & Wang, L, L. . (2019). Current status and development trend of psychobiography research in China - A citespace-based knowledge graph analysis. *Journal of Huazhong Normal University (Humanities and Social Sciences Edition)*, 058(004), 185-192.
- [9] Zhu, B, X. , & Ma, C. . (2019). Citespace-based knowledge graphing analysis of crowdsourced innovation research. *Science and Technology Management Research*, v.39;No.427(09), 8-16.
- [10] Li, J, F. , Huang, F, H. , & Ren L. . (2018). knowledge graphing of research hotspots and frontiers in the service supply chain field - An econometric analysis based on citespace IV. *Business Studies*, 25(06), 70-79.
- [11] Zheng, H, M. . (2016). An introduction to the impact of the Internet era on the generation of public opinion. *Modern Communication* (07), 248-248.
- [12] Journal of Intelligence. (2009). CiteSpace II: Identification and visualization of new trends and dynamics in the scientific literature.
- [13] Aguilar, J. , & O Terán. (2015). *Social media and free knowledge: Case study - public opinion formation*. Retrieved from <https://www.researchgate.net/publication/305534980>
- [14] X Han, Wang, J. , Zhang, M. , & X Wang. (2020). Using social media to mine and analyze public opinion related to covid-19 in china. *International Journal of Environmental Research and Public Health*, 17(8), 2788.
- [15] Gu, Y. , & Zhang, B. . (2019). *Social Network Public Opinion Evolution Model Based on Node Intimacy*. 2019 Chinese Control And Decision Conference (CCDC). IEEE.
- [16] Leiserowitz, A. . (2006). Climate change risk perception and policy preferences: the role of affect, imagery, and values. *Climatic Change*, 77(1), 45-72.
- [17] The, U. , Journals, & Yakubov, S. . (2021). Significance and necessity of digitalization of citizens' control over the activities of state bodies. *The Journal of Criminal Law and Criminology* (1973-), 115-123.
- [18] Zhang, Y. , Chen, J. , Liu, B. , Yang, Y. , Li, H. , & X Zheng, et al. (2020). Covid-19 public opinion and emotion monitoring system based on time series thermal new word mining. *Computers, Materials and Continua*, 64(3), 1415-1434.
- [19] Haeder, S. F. . (2021). Joining the herd? u.s. public opinion and vaccination requirements across educational settings during the covid-19 pandemic. *Vaccine*. DOI : 10.1016/j.vaccine.2021.03.055