

Research on public opinion monitoring and decision-making of college students' social network under human-machine collaboration

Dandan Zhu

Wuhan Institute of Biological Engineering,

Wuhan, Hubei, China

E-mail: 76354907@qq.com

Abstract—Social network public opinion has a significant impact on the values of college students, and at the same time brings great challenges to the governance of campus public opinion. Traditional public opinion processing has the problems of poor timeliness and low analysis accuracy. Based on the perspective of man-machine collaboration. The data analysis method is used to analyze the effect of human-machine collaborative mode processing in the network public opinion, and the applicability and limitations of the existing methods are discussed. The experimental results show that the monitoring and decision-making of public opinion on social network under the man-machine collaboration mode can effectively reduce the diffusion of negative public opinion, and provide reference for decision-making of online public opinion governance in universities.

Keywords—man-machine collaboration; college students; social network public opinion; decision-making strategy

I. INTRODUCE

By December 2024, the number of social network users in China had reached 1.101 billion, accounting for 99.3% of the total Internet users' [1]. In social platforms, campus events, academic pressure, social entertainment and mental health have shown explosive growth, bringing new opportunities and challenges to the ideological and political education in colleges and universities. For example, the incident of "depressed patients suffered from Internet violence" in a university fermented within 48 hours, and the number of negative comments exceeded 500,000, of which abusive comments accounted for 34%. As we can see, the network public opinion is easy to deviate from the bad direction of the fact, posing a huge threat to the network environment and even the social environment[2].

In the current era of network information explosion, network public opinion dissemination shows complex characteristics such as fissile, cross-platform, and dynamic. After in-depth analysis, we believe that the potential reasons leading to the traditional public opinion handling model being unable to meet the needs of efficient handling are mainly two aspects. First, there are obvious efficiency bottlenecks and cost pressures. From the outbreak of public opinion to the initial control stage, the average time of manual processing is between 12 and 30 hours. During this period, negative public opinion can spread rapidly through social media, news

information platforms and other channels, leading to the continuous expansion of the impact range of the event, and the difficulty of subsequent handling increases exponentially. Second, although artificial intelligence has shown strong data processing capabilities in the field of network public opinion handling, it cannot completely replace human decision-making in key links involving ethics, values, and legal risks. Artificial intelligence operates based on algorithms and data models. When dealing with complex social issues and value judgments, it lacks the emotional cognition, moral intuition, and legal professionalism possessed by humans. In order to control network public opinion in a timely manner, we have the following questions: ①How to optimize the work mode and process of human-machine collaboration in the face of complex, sudden, and dynamic cross-platform data? ② On the basis of artificial intelligence completing data mining and trend prediction, how to combine human professional knowledge, experience judgment, and artificial intelligence analysis results to create standardized and modular processing processes, so that public opinion handling plans can be widely used in different industries and scenarios, thereby enhancing the network public opinion handling capabilities of the whole society.

Therefore it is necessary from the perspective of "man-machine collaboration", analysis of man-machine synergy in social network public opinion governance strategy mechanism, based on this we put forward the "IM-DT-HD" model, introduces the concept of "IM-DT-HD", an overview of man-machine collaborative processing network public opinion mechanism, finally based on experimental verification, review the man-machine collaborative decision advantages and disadvantages, can further explore the direction of the future.

II. RELATE WORD

A. Related studies

The existing research on human-machine collaborative decision processing network public opinion is very rich. D Zheng et al. In view of the public opinion communication in the cross-social platform coupled network, by constructing the two-layer BA scale-platform coupled network model and applying the SEIR model for dynamic simulation, the internal mechanism of cross-platform public opinion communication[3] is deeply discussed. The process analysis of online public

opinion monitoring focuses on the analysis of [4] in the communication stage, the exploration of communication subject [5], and the evolution of communication process [6]. Although AI is getting closer to humans through the development of technology, it still has great defects in social and emotional intelligence [7], self-awareness and self-reflection [8], and creativity and social intelligence [9]. Only in the process of collaboration with humans can AI fully leverage its strengths and enhance each other's capabilities [10]. The above research views have laid a solid foundation for the collaborative optimization of public opinion monitoring and decision-making on social networks.

B. Case analysis

Figure 1 describes the effect of comparing the traditional mode and human-machine collaborative processing of n etwork public opinion in the "2023 Intelligent Public Opin ion Governance White Paper" from China Information and Communication Institute. In the age of information explo sion, the traditional public opinion handling model is diffi cult to meet the rapidly changing needs, while the human-machine collaborative decision-making with its efficiency, comprehensiveness and economy has become the new tren d of network public opinion governance. As shown in Fig ure 1, the response speed of human-machine collaborative decision-making network public opinion response is within the range of 0.5-6 hours, expanding the range by 90%. I n addition, human-machine collaborative processing networ k public opinion coverage and manpower costs show over whelming advantages, and by combining human experience and wisdom with machine efficiency and precision, it has achieved a qualitative leap in public opinion governance capabilities.

TABLE 1. QUANTITATIVE EVALUATION OF THE EFFECTIVENESS OF HUMAN-MACHINE COOPERATION IN HANDLING NETWORK PUBLIC OPINION.

dimension	The traditional model	Man-machine coordination mode	Improve the range
response speed	For 24 – 72 hours	In the range of 0.5-6 hours	90%↑
forecast accuracy	62%-75%	83%-94%	30%↑
Decision coverage	45%-60%	88%-97%	50%↑
human cost	Between 20-30 persons / 24 hours	And 2-5 persons / 24 hours	80%↓
Emotional resolution efficiency	35%-50%	72%-89%	100%↑

Data source: 2023 Intelligent Public Opinion Governance White Paper issued by China Information and Communication Institute

C. Research and breakthrough direction

With its powerful computing capabilities and algorithm advantages, artificial intelligence technology has built a multi-dimensional and multi-level technical architecture. In the horizontal dimension, it can cover all network platforms such as social media, news websites, forum communities, etc., and

realize the comprehensive collection of massive heterogeneous data; in the vertical depth, through natural language processing, machine learning, deep learning and other technologies, it can not only quickly grasp public opinion information, but also conduct in-depth analysis from semantic understanding, transmission path and other levels, and complete the function of real-time data processing and public opinion monitoring.

However, although artificial intelligence has shown amazing efficiency and precision in data processing and monitoring, it has obvious limitations in the strategic level of public opinion decision-making. The operation logic of artificial intelligence is based on established algorithm models and historical data, lacking the ability to perceive complex situations in the real world and adapt flexibly. It cannot fully consider the social and cultural background, public psychological dynamics, policy and regulatory environment and other difficult-to-quantify factors, nor can it balance the demands of different interest groups.

In the face of key decisions that require weighing the pros and cons, grasping the overall situation, and making value judgments, artificial intelligence is unable to propose strategic recommendations that are forward-looking, systematic, and creative, and cannot replace the comprehensive judgment made by human decision-makers based on experience, intuition, and values. This technical shortcoming makes artificial intelligence always require the deep participation and guidance of human wisdom in the core decision-making link of public opinion governance. We must take artificial intervention and decision-making as means, adopt comprehensive policies, multiple governance, and a combination of flexibility and rigidity, and jointly enhance the ability to respond to network public opinion through human-machine combination.

III. METHODOLOGY

A. IM-DT-HD Model

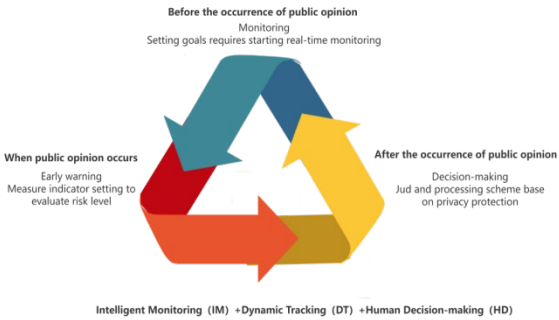


Figure 1. Human-machine collaborative public opinion monitoring and decision-making model

B. Concept and operation rules of IM-DT-HD Model

Intelligent monitoring (IM): The intelligent attribute represented by "Intelligent" relies on cutting-edge technologies such as machine learning, deep learning, and natural language processing to give the system powerful analysis and decision-making capabilities; the monitoring function covered by "Monitoring" enables dynamic tracking of the target object

through the establishment of a comprehensive data collection network. The combination of the two enables IM to break through the limitations of the traditional monitoring mode and efficiently complete the monitoring task in complex environments in an automated and intelligent manner. Activate the AI public opinion monitoring platform before the public opinion occurs to open real-time monitoring for the designated area.

Dynamic Tracking (DT): "Dynamic" emphasizes that the system does not capture information statically, but continuously monitors the evolution of the target object in the time dimension with a response speed of milliseconds; "Tracking" focuses on precise positioning and continuous follow-up of the target. In the intelligent real-time monitoring scenario, dynamic tracking technology plays a crucial role, and the integration of the two enables the system to keenly capture subtle changes and realize the full life cycle insight of the target. With the help of cutting-edge technologies such as natural language processing, semantic analysis, and sentiment analysis, the system can scan multi-source data such as news information, social media platforms, and forum communities in real time. Once sensitive words appear, the system will quickly trigger the capture. The system will present the integrated public opinion information in the form of visual charts and concise reports, and submit it to the human decision-making layer at the first time.

Human decision-making (HD): "Human" refers to humans, and "decision-making" represents decision-making, representing artificial decision-making. After artificial intelligence completes the real-time monitoring of public opinion information and the initial assessment of risks, professional personnel still need to intervene and deal with it. In order to ensure that personal privacy is fully protected, the process of artificial intervention strictly follows relevant laws and regulations and ethical guidelines, and on the basis of de-identification, conducts in-depth analysis of public opinion events. Decision-makers must not only consider the objective data such as the scope of public opinion dissemination and the trend of popularity, but also the subjective factors such as the emotional tendency, value concept and ethical appeal expressed by ID users.

IV. EXPERIMENTAL DESIGN AND RESULTS ANALYSIS

A. The experimental environment

- Data set: Obtain social network data of a university from February to March 2025 (including 23,000 posts, 15,000 comments); data include user ID, time, location of comments, comments, number of retweets, replies and likes.
- Tool: "Qingbo Public Opinion" platform.

B. Experimental Procedures

As shown in Figure 2, we conducted an experiment by extracting the network public opinion data of a certain university from the Qingbo Public Opinion Monitoring Platform. Through AI intelligent monitoring and real-time dynamic tracking, we issued an early warning and made a decision manually. As shown in Figure 3, through the Qingbo

Public Opinion Monitoring platform, the number of network public opinion incidents decreased.

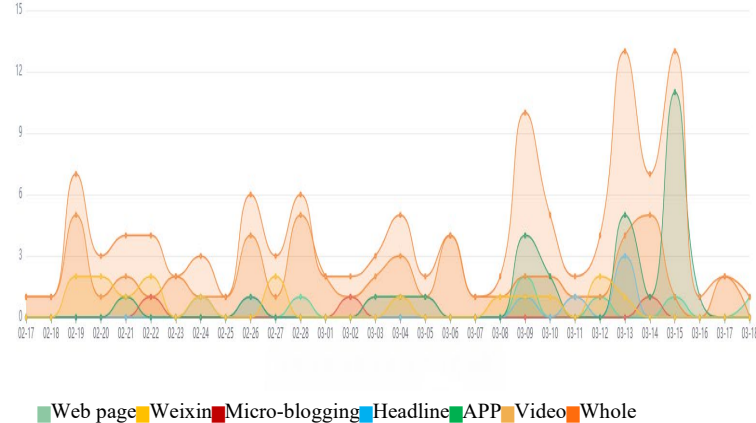


Figure 2. Summary of public opinion monitoring data in the Qingbo public opinion monitoring platform

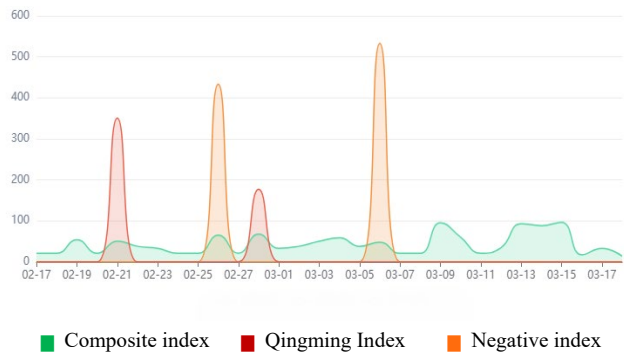


Figure 3. Public opinion index in the Qingbo public opinion monitoring platform

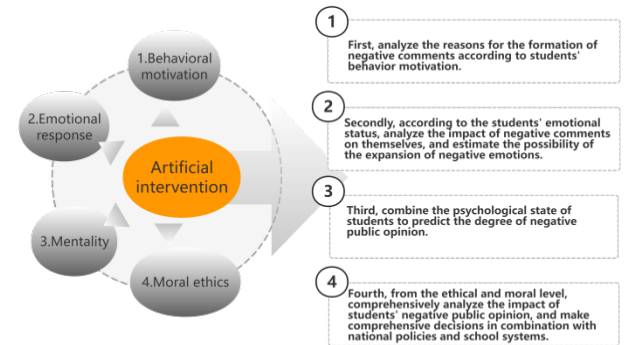


Figure 4. Artificial intervention in the implementation of public opinion decision

C. Experimental results

- Monitoring efficiency: As shown in Figure 3, the number of network public opinions monitored through the Qingbo Public Opinion Monitoring Platform has decreased. The accuracy of AI in identifying negative public opinions is 95%, which is 50% higher than that of manual identification;

- Decision effect: the spread rate of negative public opinion is reduced by 28%; 83% of students think that artificial decision-making is "more intimate";
- User feedback: Combining the process of human intervention in the implementation of public opinion decision-making in Figure 4, 90% of teachers believe that AI and human collaboration can not only effectively control the spread of public opinion, but also protect students' privacy and achieve the goal of value education.

V. DISCUSS AND OPTIMIZE THE SUGGESTIONS

A. Technical Challenges

- Data privacy: In real-world scenarios, the complexity of human emotional expression, the differences in language and culture, and the concealment of motivations behind behavior pose many challenges to the accuracy of AI in this regard. AI warnings and judgments are largely dependent on models trained on historical data. In the face of dynamic and changing real-world scenarios, unexpected events, or new patterns, the generalization ability of the model is often insufficient, and its accuracy needs to be further improved.
- Limitations of decision-making: The standard setting of artificial decision-making is often limited by the cognitive level, value orientation, and experience background of decision-makers. Different decision-makers may have significant differences in judgment of the same public opinion event, making it difficult to form a unified and scientific judgment scale. In the face of the relationship between "prevention" and "guidance", how to flexibly adjust the governance strategy according to the nature, dissemination scope and audience characteristics of different public opinion events, give more humanistic care to the governance of network public opinion, enhance the temperature and effect of governance, also test the wisdom and ability of artificial decision-making.

B. Strategy optimization

- Dynamic monitoring mechanism: use natural language processing technology to analyze students' text speech, use sentiment analysis algorithm to judge emotional fluctuations; use behavioral trajectory analysis technology to capture abnormal behavior patterns; combine knowledge graph and learning data analysis to analyze students' cognitive level. Dynamically adjust AI model parameters to enable the monitoring system to adapt to the characteristics and needs of different individuals, timely detect potential problems and intervene, and realize the intelligent and scientific management of education while ensuring students' privacy.
- Multi-role coordination: Integrate teachers, psychological experts, and artificial intelligence systems to form a closed-loop management system of "public

opinion-early warning-guidance-education-strengthening-response." The three parties cooperate to carry out educational intervention, and through continuous tracking to strengthen the effect of education, form a virtuous circle, and realize the whole process and fine management of campus public opinion.

VI. CONCLUSIONS AND PROSPECTS

Public opinion management on social media is not a task of a single subject. Combining "civil air defense" and "technical defense" should use big data public opinion monitoring technology to realize multi-dimensional, multi-level and multi-field monitoring, grasp the mainstream direction of network public opinion, through the complementary design and dynamic interaction mechanism, to guide network public opinion in an orderly manner, reasonably respond to network public opinion, and create a good social network ecology. The man-machine collaboration strategy proposed in this paper significantly improves the efficiency and accuracy of public opinion governance of college students' public opinion. The future research can further explore how to build a virtual campus public opinion practice environment, deepen the effect of man-machine collaborative decision-making, and propose measures of "appropriate medicine" to promote the benign development of social network public opinion space.

REFERENCES

- [1] China Internet Network Information Center (CNNIC). (2025)CNNIC released the 55th Statistical Report on Internet Development in China. In:China. EB/OL. <https://cnnic.cn/n4/2025/0117/c208-11228.html>
- [2] Wang, J., Peng, Y. Q., Zhao, Y. F., & Yang, J. (2022)Survey of social network public opinion information extraction based on deep learning.J.Computer Science.,49: 279–293. <https://doi.org/10.11896/jsjx.220300099>
- [3] Zheng, D. M., Li, S. J., Zheng, J. L., et al. (2024)Research on modeling and simulation of cross-platform social network public opinion dissemination. J. Journal of Agricultural Library and Information.,36(8): 69–81. <https://doi.org/10.13998/j.cnki.issn1002-1248.24-0506>
- [4] Greer, C. F., & Moreland, K. D. (2003)United Airlines and American Airlines online crisis communication following the September 11 terrorist attacks. Public Relations Review.,29(4): 427–441. <https://doi.org/10.1016/j.pubrev.2003.08.005>
- [5] Park C S. (2013)Does Twitter Motivate Involvement in Politics? Tweeting, Opinion Leadership, and Political Engagement. J. Computers in Human Behavior.,29: 1641-1648. <https://doi.org/10.1016/j.chb.2013.01.044>
- [6] Li, H., & Sakamoto, Y. (2014)Social Impacts in Social Media: An Examination of Perceived Truthfulness and Sharing of Information. J. Computers in Human Behavior.,41: 278–287. <https://doi.org/10.1016/j.chb.2014.08.009>
- [7] Vincent, V. U. (2021)Integrating intuition and artificial intelligence in organizational decision-making. J. Business Horizons.,64(4):425-438.<https://doi.org/10.1016/j.bushor.2021.02.008>
- [8] Jarrah, M. H., Askay, D., Eshraghi, A., et al. (2022)Artificial intelligence and knowledge management: A partnership between human and AI. J. Business Horizons.,66(1):87-99. <https://doi.org/10.1016/j.bushor.2022.03.002>
- [9] Chowdhury, S., Dey, P., Joel-Edgar, S., et al. (2023)Unlocking the value of artificial intelligence in human resource management through AI capability framework. J. Human Resource Management Review.,33 (1), DOI: 10.1016/J.HRMR.2022.100899
- [10] Jarrah, M. H. (2018) Artificial intelligence and the future of work: Human-AI symbiosis in organizational decision making. J. Business Horizons.,61(4):577-586. <https://doi.org/10.1016/j.bushor.2018.03.007>