

Research Perspectives and Key Issues of Social Public Opinion Analysis and Decision Support in the Big Data Environment: Postprint

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Abstract

Purpose: To analyze demands within the big data context and explore the theoretical foundations and key research questions in social public opinion analysis and decision support.

Methods: Comprehensively integrating theories and methods from library and information science, journalism and communication, public administration, computer science, psychology, system dynamics, and complex networks, and based on investigations of social reality and analyses of industry practices, research perspectives are summarized and refined.

Results: Six perspectives, including “the integration of ‘epistemology’ , ‘decision theory’ , and ‘systems theory’ ” , are proposed to guide research design and structure research content, focusing on addressing five key issues such as exploring the theoretical foundations of how social public opinion dissemination influences government decision-making.

Conclusion: Big data presents new opportunities for social public opinion analysis and government decision support, urgently necessitating the proposal and adoption of novel research perspectives to solve critical problems.

Full Text

Social Public Opinion Analysis and Decision Support in the Big Data Environment: Research Perspectives and Key Issues

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Abstract

[Objective] This paper analyzes the demands posed by the big data context and explores the theoretical foundations and key research questions in social public opinion analysis and decision support. **[Methods]** Drawing upon theories and methods from library and information science, communication studies, public administration, computer science, psychology, system dynamics, and complex networks, we synthesized research perspectives based on examination of social realities and analysis of industry practices. **[Results]** We propose six perspectives to guide research design and content organization, including the integration of “epistemology, decision theory, and systems theory,” and identify five key issues, with particular emphasis on exploring the theoretical basis for how social public opinion dissemination influences government decision-making. **[Conclusions]** Big data presents new opportunities for social public opinion analysis and government decision support, urgently necessitating the adoption of novel research perspectives to address critical challenges.

Keywords: Social public opinion analysis; Government decision support; Research perspective; Key issues; Big data

Classification Number: G350

1. Introduction

Emerging technological developments have ushered in new social formations and a novel ecosystem of social public opinion dissemination characterized by media convergence. When evaluating government decision-making and social public policies, concerning themselves with social events, expressing emotions and demands, and asserting and defending rights, the public can now link the “virtual” with the “real,” connecting online and offline spaces to transmit their observations and thoughts to others in the briefest, most rapid manner. This enables public opinion to swiftly enter reality and demonstrate its capacity to intervene in social judgments. Consequently, media-driven emotional outbursts and group emergencies triggered by social public opinion are no longer isolated random events themselves, but rather represent a systematic reconstruction of the environment, order, and rules governing public opinion dissemination—a constant presence that generates impact at any moment. Within this context, the disconnect between social reality and public perception, conflicts between public opinion responses and government reactions, diversified agenda-setting such as “official-business collusion,” “ignoring public opinion,” and “citizen resistance,” as well as the frequent occurrence of public opinion that distorts facts, misleads and incites the public, instantly ignites group effects, and severely damages government credibility, have all increased social instability factors and

complexity, intensifying the difficulty of government management. This reality forces profound changes in government functions, management approaches, and operational methods, posing an enormous challenge to public administration—traditional management and control methods may face failure or even complete breakdown. Therefore, new perspectives and technologies are urgently needed in social public opinion analysis and government public decision-making management.

The advent of big data has broken through conventional understanding of data, injecting revolutionary momentum into technological development. While presenting various challenges in handling massive data volumes, it also brings new development opportunities for social public opinion analysis to support government public decision-making management. On one hand, the diversification of public opinion dissemination forms, the vastness of information quantity, the heterogeneity and diversity of data types, the high decentralization of information content, and the fragmentation of various conversations—all catalyzed by digital technology—have created a severe crisis for traditional research methods in acquiring, organizing, and analyzing social public opinion information. This has led to a relative decline in the quality of social public opinion analysis and an increased risk in decision-making based on such analysis, leaving government decision-making management facing more chaotic demands, feedback, and supervisory public opinion information [?]. On the other hand, although big data development has submerged public opinion dissemination in a vast ocean of unstructured data, big data technologies can comprehensively record a series of characteristic data about the public's current emotions, behaviors, concerns and interests, locations, movement trajectories, and social relationship chains. This represents not only the product of information technology merging virtual society with real society, but also a reflection of public participation in politics and policy discussion. Meanwhile, the big data mindset advocating massive data storage, enhanced correlation and analysis functions, and service provision for prediction, along with its development trends, offers unprecedented opportunities to deeply excavate information about changes and patterns in public attitudes, viewpoints, and emotions embedded in social public opinion, transforming it into knowledge or wisdom to support the establishment of government public management public opinion processing mechanisms and auxiliary decision-making management systems that are still in their infancy.

Therefore, in the big data context, researching social public opinion analysis and decision support and constructing corresponding methodological systems to further enhance government departments' capabilities in judging, early warning, and rapid response to social public opinion has become a hot research field and topic of common concern across disciplines including library and information science, communication studies, and computer science.

What then are the urgent needs for researching social public opinion analysis and decision support in the big data environment? From which perspectives should research 切入? What key research questions are involved? These are the

primary considerations when undertaking related research. This paper attempts to explore these questions to provide reference and guidance for subsequent studies.

2. Research Framework

2.1 Research Needs and Approaches In the big data environment, on one hand, the massive, timely, dynamic, and open nature of data improves the validity and depth of data analysis. On the other hand, low value density, rapid dissemination speed, and the scientific validity of data analysis models directly affect data analysis quality. The core value of big data lies in storing and analyzing massive data to provide services for prediction. Applying big data thinking and technology specifically to social public opinion analysis and decision support requires enhancing the analysis and prediction of associated public opinion information, expanding research focus from simply collecting valid data to in-depth judgment of public opinion content, tracking and acquiring associated public opinion and systematically organizing similar public opinion information, excavating the usable value of public opinion information, and producing products and services for decision-making reference.

From a social reality perspective, various emerging public opinion events involve both concentrated emergencies and dispersed normal events, concerning both crisis decision-making management and routine decision-making management. Public opinion analysis of emergencies can identify social contradiction flash-points, public venting outlets, and focal points for government decision-making. However, the continuous task of social public opinion analysis should be transforming public opinion data into information for judgment and prediction, and further into knowledge or wisdom supporting decision-making—by collecting, organizing, and associating normal events to discover patterns in similar public opinion events and generate decision-supporting evidence or arguments.

From industry research and practice perspectives, some disciplines have begun exploring social public opinion analysis in the big data environment, such as communication studies and library and information science, but most remain at the theoretical discussion stage, examining characteristics and dissemination mechanisms of public opinion analysis under big data. Computer science mostly focuses on key technical research such as visualization, public opinion content analysis, and associated semantic mining [?]. However, current domestic public opinion research still primarily focuses on regularly releasing public opinion reports and analysis reports during emergency response processes, lacking long-term analysis of normal events, rarely conducting association and evolution analysis between normal events and emergencies, between public opinion events and real society, and among different social public opinion events, and lacking systematic research on modeling and simulation, risk assessment, and early warning mechanisms for social public opinion events [?]. The essence of existing research focuses remains primarily on the application of public opinion information, lacking multi-dimensional processing and organization of public opinion

information similar to scientific and technological information, effective storage, and subsequent mining and analysis to transform information into knowledge for judgment and prediction. The common practice of addressing issues in isolation and focusing on response results cannot achieve the transition from “doing things right” in the past to “doing the right things” in the future.

Therefore, research on social public opinion analysis and decision support needs to leverage the emerging big data mindset and technology’s capabilities in data storage, event association, and prediction, comprehensively apply multidisciplinary theories and methods, and through social public opinion analysis, transform social public opinion information into knowledge supporting decision-making, providing services for decision-makers’ judgment and prediction, and supporting decision-makers in choosing to “do the right things” in the future based on the “doing things right” patterns of the past.

2.2 Theoretical Foundations and Research Perspectives Addressing the aforementioned research needs, this paper argues that related research constitutes a comprehensive topic involving multiple disciplines including library and information science, computer science, communication studies, public administration, psychology, system dynamics, and complex networks, requiring support from multidisciplinary theory and method integration, and should introduce different research perspectives and establish corresponding research systems according to different research emphases. Therefore, based on research needs and aiming for government decision support, this paper proposes the following research perspectives for different stages of social public opinion analysis: information acquisition and organization, association and mining, model construction and simulation, and evaluation and decision-making application.

(1) Guiding Research Design with the Integration of “Epistemology, Decision Theory, and Systems Theory”

The combination of “epistemology” and “decision theory” serves as both the primary theoretical basis for research design and an overarching research perspective. Epistemology is a philosophical branch exploring the nature, origin, and scope of knowledge. The “DIKW Value Chain” in epistemology is a scientific system illustrating knowledge generation (see Figure 1 [Figure 1: see original paper]) [?], which states that data, information, and knowledge can be progressively transformed and understood to produce wisdom guiding future “right actions.” Decision Theory refers to the science of using quantitative methods to find or select optimal decision-making solutions based on information and evaluation criteria, a branch of operations research. The “control-feedback-judgment-adjustment” process in decision theory is the dynamic mechanism for knowledge activation [?]. Systems Theory studies general patterns, structures, and laws of systems, with its holistic thinking serving as the guarantee for knowledge utility [?].

Integrating knowledge generation systems, knowledge activation mechanisms,

and holistic thinking can guide the derivation of research questions, construction of research content, and design of research approaches. In knowledge generation, building upon extending the applicable objects and application scope of “epistemology” and using social public opinion information in the big data environment as a new research object, we can apply, improve, and deepen existing theories and methods to achieve transformation and value-added of social public opinion information to public opinion knowledge, drawing on research outcomes regarding development status, hot spots, difficulties, mutations, contexts, and trends of scientific knowledge. In knowledge activation, based on public opinion knowledge obtained from public opinion information analysis, we can explore efficient social public opinion guidance strategies, management operation mechanisms, and response strategy systems to form auxiliary decision support applications for social public opinion, achieving knowledge activation for specific decision-making needs. Through “control-feedback-judgment-adjustment,” we can realize interaction and feedback with social public opinion knowledge to improve decision support service quality. In knowledge utility, we need to construct social public opinion analysis and auxiliary decision support systems from holistic perspectives of system structure, function, and environment.

(2) Studying Public Opinion Impact on Decision-Making from the Perspective of “Alliance of Decision Makers” Under Media Convergence in the Big Data Era

The concept of “Media Convergence” was first proposed by Paul A. Sabatier of the Massachusetts Institute of Technology [?], originally referring to the trend of various media presenting multifunctional integration. The main idea of the “Alliance of Decision Makers” proposed here assumes that public policy can be defined by defining political belief systems—that is, defining prioritized value orientations, primary causal relationships (correlations), problem importance, and the role of relationships among various institutions (stakeholders) in achieving value orientations. It distinguishes dynamic factors within policy subsystems (various information sources) from interference factors from broader political systems and socio-economic environments, assuming that changes in the policy core of policy subsystems must necessarily involve influences from various external factors [?].

“Media Convergence” has enhanced interchangeability and interconnectivity among different media, integrating various public opinion information on the same platform. However, as public opinion is shaped unstably in a multi-stage process by multiple typical, conflicting information flows, it can constitute a “Receive-Anticipate-Extract” (RAS) model [?]. If decision-makers can, within mixed holistic data, pay attention to the personal attitudes and values of policy objects or stakeholders, and discover rules and sequencing of relevant organizations within complex, valid data, they need to consider more extensively the socio-economic environment of decision-making formulation and implementation. Studying social public opinion and government decision-making from the perspective of the “Alliance of Decision Makers” under media convergence in

the big data era can guide researchers to discover internal mechanisms and influences.

(3) Studying Public Opinion Information Acquisition and Organization from the Perspective of “Attentional Capture and Semantic Association”

Attentional Capture is a phenomenon in cognitive science where an individual's perception prepares for external stimuli—that is, the appearance of a stimulus temporarily diverts attention from the current task to this stimulus [?]. It is influenced by both top-down goal-driven endogenous attention and bottom-up stimulus-driven exogenous attention [?]. The basic idea of semantic association comes from the Semantic Web, whose core is conducting association analysis and semantic mining between semantics. The Semantic Web concept was proposed by Berners-Lee, with the basic idea of extending the existing Web by endowing various Web resources with explicit semantic information, providing machine-processable data semantics, enabling computers to automatically process, distinguish, and identify these semantic information, and automatically interpret, exchange, and process them for full data sharing and reuse [?].

Combining “attentional capture and semantic association” can guide researchers to effectively conduct public opinion information acquisition and organization research in the big data era. The attentional capture research paradigm can guide researchers to first examine what public opinion information can capture audience attention, then systematically and effectively collect user-concerned public opinion event information that may become hot topics from multiple angles. The semantic association perspective can guide researchers to establish semantic associations from content, conducting screening, processing, classification, and topic extraction of collected information based on semantic relationships. This involves establishing associations among same-theme events across different time and space dimensions, among same-time events across different space and event dimensions, and among same-space events across different time and event dimensions—creating wide-time, broad-dimension, and multi-event associations.

(4) Studying Public Opinion Association and Mining from the Perspective of “Enhanced Lasswell Model and Deep Aggregation”

Lasswell's 5W communication model (“Who says What to Whom in What channel with What effect,” i.e., communicator, audience, content, channel, effect), proposed in 1948, not only reveals linear relationships among communication elements but also emphasizes the linkages through which communication effects are produced, becoming a classic theory in communication studies [?]. In research, guided by the 5W model and introducing “noise” elements in public opinion dissemination and “control” elements such as interactive influence and feedback between government decision-making and public opinion, we can construct an enhanced Lasswell-element-based social public opinion analysis methodology system. On this basis, we can conduct analysis and deep mining of communication elements and their relationships, emphasizing semantic associa-

tion and deep aggregation research of different opinion sessions at the element level, integrating multi-media social public opinion information that has been associated, and researching various types of social public opinion analysis models oriented toward government decision support. This reveals themes, communication patterns, evolution laws, emotional tendencies of social public opinion information, and similarity calculation models for social public opinion event response strategies, providing important support for subsequent public opinion information mining, analysis, and decision support. Therefore, the research perspective combining “enhanced Lasswell model and deep aggregation” not only expands classic theories but also provides important guidance for social public opinion association and mining research in the big data context.

(5) Studying Public Opinion Evolution Modeling and Simulation from the Perspective of “Cognitive Behavior, Media Literacy, and Interactive Decision Making”

The term “cognition” refers to all processing processes involved in transforming, simplifying, refining, storing, recovering, and utilizing sensory input. Cognition participates in everything humans may do, and any psychological phenomenon is simultaneously a cognitive phenomenon [?]. The essence of cognition is the process by which people process information in response to external events acting on their sensory organs. Cognitive psychology views the cognitive process as an information processing system consisting of a series of continuous cognitive operation stages including information acquisition, encoding, storage, retrieval, and use [?]. “Media Literacy” was proposed by British scholars E.R. Leavis and Denys Thompson in 1933 [?]. In 1992, the American Center for Media Literacy defined media literacy as people’ s ability to select, understand, question, evaluate, create, and produce various information from media, as well as their ability to think critically [?]. It focuses on the cognitive process of information, reflecting individuals’ ability to effectively utilize rich external content, and to identify and reject content that does not align with their interests.

“Interactive Decision Making” proposed in this paper, also known as government public decision response, refers to the public management process where government actively responds to public demands and adopts proactive public decision measures to justly and effectively realize public needs and interests—the shift from “deciding for the people” to “deciding together” is an interactive decision response mechanism [?]. In social public opinion analysis and decision support research, combining “cognitive behavior, media literacy, and interactive decision making” and starting from examining online group cognitive behavior to study their media literacy, then analyzing influencing factors of interactive decision making, enables systematic empirical investigation and modeling simulation of group behavior in social public opinion evolution processes.

(6) Studying Government Decision Support Application Systems from the Perspective of New Public Management Based on Resource Integration

New Public Management theory uses modern economics and private enterprise management theories and methods as its theoretical foundation. Rather than emphasizing centralized control, supervision, and strengthened accountability to improve administrative performance, it advocates adopting entrepreneurial management methods in government management to improve efficiency, introducing competition mechanisms in public management to enhance service quality and standards, and emphasizing market or customer orientation in public management to improve administrative performance [?]. The government management functions advocated by New Public Management theory require comprehensive innovation of traditional models to improve public management levels and public service quality, which can be achieved through effective integration of various information resources using big data thinking and technology. Therefore, from the research perspective of New Public Management based on resource integration, researchers can be guided to explore and analyze characteristics and evolution patterns of social public opinion dissemination in the big data era, integrate advanced technologies and methods, and comprehensively 梳理 and construct application systems oriented toward government decision support.

3. Key Research Questions, Priorities, and Challenges

Taking the social public opinion analysis and decision support process as the dimension and the above research perspectives as theoretical support, this paper explores key questions, priorities, and challenges involved in transforming public opinion data and information into knowledge and wisdom to form decision support products or services, as shown in Figure 2 [Figure 2: see original paper].

3.1 Key Question Analysis (1) How to scientifically reveal the mechanism by which social public opinion dissemination influences government decision-making in the big data environment?

This question runs throughout the entire public opinion DIKW process. From the government demand perspective: through which channels does the public reflect what issues or evaluations during government public decision-making implementation processes, what impacts and changes will this public opinion produce for the government, and how should government departments respond and revise decisions? In normal events, how should government departments utilize scattered but pattern-presenting public opinion and through what effective channels promote mainstream social public opinion? In emergencies, what are the patterns of group behavior, and what are the impacts of secondary fermentation from typical events on subsequent government decision-making? Furthermore, how can government decision-making departments enhance response capabilities during public opinion guidance processes and disseminate beneficial experiences absorbed after resolving certain public opinion contradictions? From the public attention perspective: which events may trigger social public opinion outbreaks or require continuous attention, how is the public influenced by public opinion

and what changes occur in their outlook on life, values, and participation awareness, and how does public opinion express itself, why does it express, and how does it evolve? Clarifying these questions requires solving the key issue of scientifically revealing the mechanism by which social public opinion dissemination influences government decision-making in the big data environment, including: theoretical basis analysis of social public opinion dissemination's influence on government public decision-making, analysis of the role and manifestation of social public opinion dissemination in government public decision-making, and analysis of how social public opinion dissemination elements and evolution affect government public decision-making.

(2) How to effectively construct a multi-dimensional organization methodology system for social public opinion characteristics in the big data environment?

This is a key question concerning the public opinion information acquisition and organization stage. On the basis of acquiring public opinion information, to better conduct association mining among social public opinion information later, we need to study, under the guidance of attention capture and semantic association theories, how to use technical means such as text mining, complex networks, and time series to conduct foundational organization of multi-dimensional attributes of public opinion information. Specific issues include: automatic classification of social public opinion events, topic extraction and clustering of social public opinion, community discovery and opinion leader identification, emotion/mood classification of social public opinion, spatiotemporal distribution of social public opinion, behavior modeling of social public opinion, and construction and visualization of social public opinion information knowledge graphs. Particularly, according to characteristics of social public opinion dissemination in the big data environment and trends facing Chinese government decision-making, specific research should focus on analyzing social public opinion information comments, studying which technical methods to use for acquiring, organizing, associating, and mining public opinion information, and then exploring resonance effects and deviation degrees between similar comment themes and original event themes.

(3) How to deeply discover topics and social public opinion themes associated between public opinion events and social reality?

This is a key question concerning the public opinion information association and mining stage. In online public opinion dissemination, various physically independent opinion sessions may have semantic associations at various communication elements. Meanwhile, historical opinion sessions serve as references for understanding developing opinion sessions, potentially growing opinion sessions, and subsequent effects of opinion sessions. Therefore, under the guidance of the enhanced Lasswell model and deep aggregation research perspective, we need to address the key issue of revealing, discovering, and aggregating associations among opinion sessions, particularly concerning topics associated between public opinion events and social reality. Specific issues include: topic discovery and social public opinion theme discovery for same-content and different-content sce-

narios. Especially, we need to attempt studying the degree of audience attention change and understanding deviation caused by embedded inflammatory terms, real-time sensitive words, and polysemous words in news headlines, and research the association between deviation degree and the transformation from normal events to emergencies, deeply aggregating various associated public opinion information to identify potential emergencies from normal events and achieve early warning and prediction of emergencies.

(4) How to dynamically establish a group behavior modeling methodology system in the process of social public opinion evolution?

This is a key question concerning the public opinion information modeling and simulation stage. Public opinion information modeling and simulation mainly examines group behavior information in public opinion evolution to understand interaction processes and manifestations between groups and media, groups and decision-making, thereby providing services for prediction and decision-making. Therefore, under the guidance of cognitive behavior, media literacy, and interactive decision-making research perspectives, we need to study how to dynamically establish group behavior modeling methodology systems in social public opinion evolution processes. Specific issues include: application strategies of group behavior modeling methods in social public opinion public group behavior, and differences in public group agent model construction, capabilities, schemas, and processes, as well as how to characterize these differences using appropriate models. Regarding public group agent model construction, how to use Agent-Based Modeling (ABM) to study relationships and interaction rules among public group agents; regarding public group cognitive behavior rules, how to use the Act-R model to study public groups' cognitive processes in social public opinion evolution; regarding public group behavior decision-making, how to use the PMFServ integrated framework to study public group behavior in social public opinion evolution; regarding public group behavior motivation, how to use the BDI model to study public groups' "Belief-Desire-Intention" in social public opinion evolution to form public group behavior selection models in social public opinion evolution processes.

(5) How to systematically construct guidance and response capability enhancement for social public opinion?

This is a key question concerning the decision-making evaluation and application stage. Social public opinion features high occurrence probability, short outbreak cycles, wide influence scope, deep harmful consequences, and great control difficulty. The emergence of social network public opinion requires rapid government response. However, current Chinese government responses still face many inappropriate issues—either responding slowly and missing opportunities, or acting excessively and violating laws and rights. Public opinion guidance and response capability building, as an important part of public opinion intervention, especially during hot spots, emergencies, or special periods, largely determines public opinion development trends. Therefore, based on the New Public Management paradigm of resource integration, we need to address key issues

concerning social public opinion guidance and response capability enhancement, specifically including: collaborative linkage mechanisms for inappropriate social public opinion crisis responses, social public opinion guidance strategies based on material phase transition thinking, diversified social public opinion response strategy systems, and social public opinion aftermath handling mechanisms.

3.2 Research Priorities and Challenges In solving the above key research questions, different research priorities and challenges arise across various stages from overall design to specific implementation:

(1) Theoretical basis exploration for modeling how social public opinion dissemination influences government decision-making in the big data environment.

Decision-making is a universal human behavior involving handling decisions about contingent events under uncertain conditions. The significance of decision-making becomes particularly important when management activities face increasingly complex environments and growing risks. “With the emergence of big data, the whole of data is more valuable than its parts. When we recombine the sum of multiple datasets, the recombined sum itself is more valuable than individual sums” [?]. Big data provides opportunities and support for social public opinion dissemination to play a positive role in government decision-making. However, breaking existing decision-makers’ closed, singular, and isolated management concepts, enabling decision-makers to possess holographic background tacit knowledge, and noticing “effective information” based on stakeholders’ shared beliefs and transforming it into knowledge will be a long-term task requiring close integration of theory and practice. Theoretically, only through systematic and multi-angle research to find or discover convincing explanations for how social public opinion dissemination influences government decision-making in the big data era can we gradually establish a research system supporting government decision-making through social public opinion analysis. Therefore, exploring the theoretical basis for how social public opinion dissemination influences government decision-making will be a research priority throughout the entire social public opinion analysis process.

(2) Constructing a fine-grained case base for public opinion analysis and decision support using big data.

Traditional public opinion analysis case bases mainly consist of descriptive documents with overly coarse granularity, which is unfavorable for similarity calculation and reasoning among public opinion events. Constructing a fine-grained public opinion event case base oriented toward public opinion decision support is particularly necessary and represents a priority challenge for researchers. Using ontologies combined with big data resources and technologies to construct fine-grained case bases can provide detailed descriptions of cases, ensure reliable operation of case base similarity calculation and reasoning, and facilitate decision-makers in retrieving and browsing relevant cases to obtain decision-

making approaches for similar events. Since case base fields are set more fine-grained, it becomes easier to provide similarity calculation for new cases and retrieval of similar public opinion events. Adding storage tables for disposal methods or approaches to fill in decision-makers' intervention measures for each public opinion event as references for handling new similar public opinion events.

(3) Applying dynamic social network analysis to mine characteristic patterns of public opinion dissemination and evolution.

Using techniques such as frequent pattern mining, change mining, association rule mining, and dynamic social network analysis to mine characteristic patterns of public opinion dissemination and evolution contained in historical public opinion case information provides predictive and early warning knowledge sources for social public opinion management. This also represents a priority challenge for researchers, requiring investigation of: public opinion dissemination and evolution characteristic models, "noise" formation characteristic models, similarity calculation models for social public opinion event response strategies oriented toward decision support, interaction influence characteristic models between public opinion and government decision-making, and high-impact public opinion content characteristic models.

(4) Constructing simulation models for public group behavior in social public opinion evolution.

Based on agent decision-making models, modeling and analyzing public group behavior decision-making, constructing specific processes and modules for simulation models, and forming public group behavior simulation models. Then, in specific research on social public opinion evolution simulation processes, based on the closed-loop interaction process of "Perception-Decision-Behavior-Action-Feedback" between behavioral entities and their environment, we need to study: based on which attribute features individual Agents as public opinion disseminators follow which rules, how to transmit perceived information to decision-making systems, and how behavior systems select behaviors and generate specific actions after decision-making.

(5) Constructing social public opinion analysis and government auxiliary decision support systems.

Constructing and applying government auxiliary decision support systems based on social public opinion analysis involves priorities and challenges concerning research implementation. How to construct software systems for social public opinion monitoring, judgment, early warning, and auxiliary decision support through system development and technical implementation to provide social public opinion analysis reports and decision-making suggestions for government decision-making departments at all levels requires studying: requirements analysis for government auxiliary decision support systems based on social public opinion analysis, overall architecture design, detailed design, social public opinion knowledge base construction, prototype system development, and application research of government auxiliary decision support systems.

4. Conclusion

Big data-driven social public opinion dissemination has brought profound impacts to China's social development and transformation. Particularly, the "butterfly effect" produced by emergencies plays a ubiquitous role in government decision-making formulation, implementation, and feedback, becoming a key topic of concern for both academia and practice. Based on preliminary research, this paper, starting from the needs of social public opinion analysis and decision support research and comprehensively applying theories and methods from library and information science, communication studies, public administration, computer science, psychology, system dynamics, and complex networks, proposes research perspectives, identifies key research questions, and analyzes research priorities and challenges to provide reference and guidance for subsequent studies and promote deepening of related research.

Moreover, research output in social public opinion analysis and decision support should result from multidisciplinary mutual promotion and support. In the field of library and information science, leveraging intelligence analysis and knowledge service thinking based on information flow, introducing theoretical principles from public administration, integrating public opinion dissemination mechanisms from communication studies, employing big data, natural language processing, and data mining technologies from computer science, exploring government decision-making needs and process norms, researching characteristics and patterns of social public opinion dissemination, and then studying methodology systems for public opinion information acquisition, organization, and analysis to construct social public opinion analysis and decision support systems in the big data environment can expand the research scope of library and information science under new ecological conditions and play a positive role.

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Note: Figure translations are in progress. See original paper for figures.

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