

The Exploration of Information Management of News Materials in the New Media Era

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Abstract: *With the development of new media technologies, news materials have become highly digitalized, multimodal, and cross-platform, exhibiting complexity and dynamism in their generation, storage, and dissemination. The materials include text, images, audio, video, and interactive data, accompanied by geographical, temporal, and user behavior information, resulting in data structures that are nonlinear, multilevel, and semantically multidimensional. Based on artificial intelligence, cloud computing, and big data technologies, this paper explores methods for the multisource collection, intelligent storage, cross-modal classification, tagging management, content correlation, and knowledge mining of news materials, and analyzes their applications in information retrieval, dynamic monitoring, and visual decision-making. The study shows that constructing an intelligent, dynamic, and scalable management system can significantly improve material processing efficiency, information integration capability, and knowledge utilization value, providing technical support and innovative pathways for news information management in the new media environment.*

Keywords: *New Media; News Materials; Information Management; Artificial Intelligence; Big Data; Visualization*

Introduction

The production and dissemination models of news in the new media era have undergone profound changes, with digitization, interactivity, and multimodality becoming the core features of news materials. The rapid expansion of information volume, the diversification of sources, and the complexity of data structures have made it difficult for traditional linear management models to meet the demands for efficient storage, retrieval, and analysis. Constructing a scientific and intelligent information management system for news materials can unify, semantically analyze, and intelligently process multisource heterogeneous data, achieving efficient utilization and knowledge-based applications of the materials. This paper takes new media news materials as the research subject, exploring technical methods for data collection, storage optimization, classification tagging, information retrieval, and content correlation, with a focus on analyzing the innovative applications of artificial intelligence, cloud computing, big data, and visualization technologies in information management. The study aims to propose a systematic, dynamic, and intelligent management approach, providing a theoretical basis and technical support for news material processing and information optimization, and promoting the transformation of news information management from static storage to knowledge-driven intelligent management.

1. Characteristics and Information Attributes of News Materials in the New Media Era

1.1 Digital Characteristics and Multisource Heterogeneity of News Materials

News materials in the new media environment exhibit highly digitalized characteristics. The information carriers have expanded from traditional text and images to multidimensional forms such as videos, audios, interactive charts, and virtual reality, forming a cross-media and cross-platform data ecosystem. These digital materials possess reproducibility, storability, and rapid transmissibility, significantly enhancing the efficiency and coverage of information flow. The digital characteristics have not only changed the mode of news production but also raised new requirements for material management. Especially throughout the entire process of information acquisition, storage, processing,

and distribution, it is necessary to establish a systematic and standardized management mechanism to ensure the integrity and traceability of data.

Multisource heterogeneity is another prominent characteristic of new media news materials. The sources of the materials cover online news portals, social media updates, user-generated content, institutional databases, and open data platforms. These sources vary significantly in terms of data formats, semantic annotations, and metadata structures, presenting technical challenges for unified management. Information heterogeneity is reflected not only in the diversity of data types but also in the nonlinear, multilevel, and semantically multidimensional structure of the data. Addressing this characteristic requires constructing an intelligent management system that supports multisource data integration, semantic unification, and standardized annotation, providing foundational support for subsequent data analysis, retrieval, and utilization^[1].

1.2 Analysis of Information Expansion and Data Structure Complexity

In the new media era, news materials exhibit a trend of rapid information expansion, accompanied by a surge in digital content, resulting in an exponential growth in the quantity of materials. News materials not only include multimodal information such as text, images, and audio-video content but also often come with additional data, such as geographical locations, timestamps, social tags, and interaction behavior data. This expansion of information brings a high degree of complexity in management and analysis, as traditional linear storage and retrieval methods are inadequate to meet the demands for efficient access, rapid retrieval, and precise analysis. Constructing efficient data indexing and retrieval systems, as well as optimizing data storage structures, become core tasks for achieving intelligent management.

The complexity of data structure is also reflected in the hierarchical and relational characteristics of materials. Within news materials, there are often multilevel relationships, such as connections between themes, subthemes, event progressions, and multimedia elements. The structural complexity increases the computational and analytical burden on information processing systems, while also providing opportunities for deep semantic analysis, event correlation analysis, and content recommendation. To address this challenge, it is necessary to introduce object-oriented data models, multidimensional semantic annotations, and intelligent indexing algorithms to achieve a panoramic understanding, refined management, and efficient utilization of material information.

1.3 Material Flow and Dynamic Characteristics in the New Media Communication Environment

News materials in the new media environment exhibit high mobility and dynamic characteristics. After generation, materials rapidly spread through social platforms, mobile terminals, online aggregation services, and cross-platform content distribution mechanisms, with their dissemination paths showing multidirectionality and traceability. The dynamic characteristics are reflected not only in the frequency of material updates and the speed of information iteration but also in the real-time combination and interactive evolution of multimedia elements during the dissemination process. Materials may be continuously edited, annotated, or recombined during circulation, presenting complex dynamic evolution characteristics. This mobility requires the information management system to have real-time synchronization, version control, and dynamic monitoring capabilities to ensure the integrity and traceability of materials' information during dissemination^[2].

The complexity of material flow provides opportunities for technological innovation in information management. By constructing dynamic tracking models, real-time analysis tools, and intelligent content association mechanisms, the flow of materials across multiple platforms and terminals can be precisely monitored, analyzing their dissemination paths, speeds, and user interaction behaviors. This not only enhances the scientific nature of material management but also provides technical support for subsequent data analysis, information optimization, and knowledge mining. Through a deep understanding of material flow characteristics, the transition from static storage to dynamic intelligent management of news content can be realized, fully leveraging the value of information management in the new media environment.

2. Construction of the Information Management System for News Materials

2.1 Intelligent Strategies for Data Collection and Storage

2.1.1 Multisource Data Collection Technology

In the new media environment, news materials come from diverse sources, including online news portals, social platforms, user-generated content, and open data interfaces. Multisource data collection technology uses automated scraping tools and unified interfaces to collect data from different platforms, while employing crawling strategies, API calls, and real-time push mechanisms to ensure the breadth and completeness of data coverage. For unstructured and multimodal data, semantic analysis and content recognition technologies must be combined for preprocessing, ensuring that the data reaches a standardized and operable state before entering the storage system.

2.1.2 Optimization of Data Storage Structure

The massive volume of news materials imposes high demands on storage systems in terms of capacity, concurrency, and reliability. Storage architectures based on distributed databases and cloud computing enable dynamic data sharding and load balancing, while redundancy backup and version control ensure data integrity and traceability. The storage of multimodal materials requires the use of hybrid storage models to manage text, images, audio-video content, and their metadata in a unified manner, forming a hierarchical and scalable storage structure, which lays the foundation for intelligent retrieval and content analysis^[3].

2.1.3 Intelligent Collection and Storage Scheduling

Intelligent collection and storage scheduling integrates data priority, access frequency, and resource utilization to achieve dynamic data management. The system can automatically adjust the collection frequency and storage strategies based on the timeliness of news events, material value, and dissemination range, ensuring efficient resource scheduling. Meanwhile, through data lifecycle management, outdated or redundant materials are automatically archived or deleted, improving system operational efficiency and information utilization value.

2.2 News Material Classification and Tagging Management Methods

2.2.1 Construction of Multidimensional Classification System

The news material classification system needs to cover dimensions such as theme, time, region, media type, and content form to achieve systematic management. The multidimensional classification system uses semantic analysis and machine learning technologies to map the core features of materials into structured information, thus supporting cross-dimensional retrieval and analysis. This system not only addresses the issue of heterogeneity in material sources but also enhances the hierarchical structure and scalability of management, providing data support for intelligent analysis^[4].

2.2.2 Tagging Management and Semantic Annotation

Tagging management uses automated algorithms to extract keywords and core concepts, mapping materials to a retrievable semantic tagging system. By integrating natural language processing and image recognition technologies, the tagging system can cover multimodal information such as text, images, and videos, enabling deep semantic annotation of news materials. A dynamic tag updating mechanism automatically adjusts based on the evolution of material content and the emergence of trending topics, ensuring that the classification and tagging system remains real-time, effective, and adaptable.

2.2.3 Classification Optimization and Intelligent Iteration

The classification and tagging system needs to be continuously optimized during operation. Through machine learning models and feedback mechanisms, the system can identify incorrectly classified, redundant, or inaccurate materials and make dynamic corrections. The intelligent iteration mechanism can analyze the intrinsic relationships between materials, optimize the hierarchical structure and tag weights, achieving a transformation from static management to dynamic intelligent management, thus enhancing the scientific nature and intelligence level of the news material management system.

2.3 Optimization Mechanism for Information Retrieval and Content Association

2.3.1 Cross-Modal Information Retrieval Optimization

New media news materials include text, images, audio-video content, and interactive elements, making traditional keyword-based retrieval inadequate to meet multimodal demands. Cross-modal information retrieval uses vectorization, embedding models, and semantic matching algorithms to map different types of materials into a unified feature space, enabling precise retrieval and intelligent recommendations. This method not only improves retrieval efficiency but also provides more relevant content results based on user query intentions and the semantic relationships of materials.

2.3.2 Construction of Content Association Network

The content association mechanism builds a semantic relationship network between materials to enable intelligent links across events and themes. The association network not only reveals the potential connections between materials but also supports in-depth exploration of the evolution of news events, trend analysis, and content aggregation. The dynamic updating mechanism can adjust the network structure in a timely manner with the addition of new materials, ensuring that content association remains real-time and continuous, providing a reliable foundation for news analysis and information management.

2.3.3 Intelligent Retrieval and Knowledge Mining

Combined with artificial intelligence technologies, information retrieval optimization not only focuses on search efficiency but also extends to knowledge mining and trend prediction. Through text mining, image recognition, and video analysis technologies, the system can automatically identify theme evolution, event hotspots, and content patterns, enabling an upgrade from single-material management to knowledge network management. The intelligent retrieval and knowledge mining mechanism provides higher-value application scenarios for the news material management system, including data visualization analysis, content recommendation, and information integration, offering technological support for the scientific and intelligent advancement of information management.

3. Technical Pathways and Innovative Applications of News Material Information Management

3.1 Application of Artificial Intelligence in Material Organization and Analysis

3.1.1 Multimodal Material Recognition and Organization

Artificial intelligence technologies can automatically recognize and organize multimodal news materials, including text, images, and audio-video content. Natural language processing technology analyzes the themes, keywords, and sentiment tendencies of textual information; image recognition technology extracts visual features and object information from images; and audio-video analysis technology performs speech transcription, scene recognition, and contextual labeling. These technologies integrate to form an intelligent material organization process, enabling multimodal materials to be quickly transformed into structured data, facilitating classification, retrieval, and analysis^[5].

3.1.2 Intelligent Semantic Annotation and Knowledge Graph Construction

Artificial intelligence-based semantic annotation technology can perform in-depth content analysis of news materials, mapping information to semantic concepts, event nodes, and relationships between entities, thus enabling the construction of dynamic knowledge graphs. Knowledge graphs not only reveal the potential relationships between materials but also support content integration and analysis across themes and time, providing technical support for multidimensional understanding of complex events. Combined with the adaptive mechanisms of machine learning, the semantic annotation system can continuously optimize the tagging system and association rules based on new materials, enabling dynamic updates of the knowledge graph. This process not only enhances the intelligence level of material management but also drives the transformation of the information system from single-material management to a comprehensive knowledge network management, providing a solid foundation for data-driven decision analysis.

3.1.3 Automated Content Analysis and Trend Prediction

Artificial intelligence in news material analysis can identify potential content patterns, event

associations, and dissemination trends, providing data support and innovative tools for information management. By using deep learning models for semantic clustering, relationship modeling, and event evolution analysis, the system can predict content development directions, user interest hotspots, and multimedia interaction patterns. This automated analysis mechanism not only improves information processing efficiency but also provides intelligent support for material optimization, content recommendation, and strategic analysis. It enables the news material management system to be proactive and innovative, enhancing its ability to quickly respond to vast amounts of multisource news information.

3.2 Integration of Cloud Computing and Big Data in News Material Management

3.2.1 Distributed Storage and Efficient Computing

Cloud computing technologies achieve efficient management and cross-platform unified access to massive amounts of news materials through distributed storage architecture and high-performance computing capabilities. Data sharding and dynamic load balancing mechanisms ensure the stable operation of the system in high-concurrency environments, while redundancy backups safeguard data security and integrity. The multi-node collaborative processing capability supports the simultaneous storage, retrieval, and analysis of large quantities of materials, providing technical support for news material management in complex data environments. Elastic computing resource scheduling allows the system to dynamically optimize resource allocation based on data traffic, computational task loads, and analytical requirements, thereby enhancing material processing efficiency, response speed, and the level of management intelligence.

3.2.2 Big Data Analysis and Multidimensional Mining

Big data technologies can process and deeply mine both structured and unstructured news material data in real-time, revealing content patterns, event evolution, and user behavior characteristics. Multidimensional analysis based on user interaction data, dissemination paths, and content features supports comprehensive management across themes, platforms, and time, providing data-driven support for informed decision-making. Big data analysis also enables hotspot identification, trend prediction, and dissemination effect evaluation, offering scientific basis for optimizing news materials and resource allocation. The integration of cloud computing and big data provides scalability, intelligence, and high efficiency to the news material management system, allowing the information management system to handle and utilize large-scale, multisource, and multimodal news materials^[6].

3.2.3 Data Security and Dynamic Resource Management

News material management involves multisource information and sensitive data, requiring the integration of cloud computing and big data systems to provide comprehensive data security strategies and resource scheduling mechanisms. Through encryption storage, access control, and security auditing, data security and traceability are ensured during the processes of collection, storage, and processing. Meanwhile, the dynamic resource management mechanism intelligently schedules system resources based on material update frequency, access priority, and computational requirements, achieving efficient resource utilization and stable operation. This mechanism not only ensures information security but also enhances system flexibility and sustainability, providing technical support for the long-term management and analysis of vast amounts of news materials.

3.3 Technical Implementation of Visualization and Decision Support

3.3.1 Multidimensional Information Visualization

Visualization technologies present massive news materials and their multidimensional relationships in an intuitive way, using formats such as knowledge graphs, network topologies, timelines, and heatmaps to display content structures and event evolution paths. Multidimensional information visualization not only improves the efficiency of information understanding but also visually reveals the complex relationships between materials, providing analysts with an intuitive basis for information integration and decision-making. When combined with interactive operations, visualization technologies enable users to dynamically filter, aggregate, and compare materials based on their needs, enhancing the precision and flexibility of management and analysis.

3.3.2 Intelligent Design of Decision Support Systems

The decision support system integrates artificial intelligence analysis results, big data mining

outcomes, and visualization presentations to provide scientific assistance for news material management. The system can generate trend predictions, content recommendations, and scenario simulations, supporting priority assessments of materials, event evolution analysis, and information flow optimization. Intelligent decision support not only enhances management efficiency but also strengthens the foresight and strategic nature of the news material management system, providing a scientific basis for resource allocation, content optimization, and information integration.

3.3.3 Dynamic Interaction and Scenario Simulation

The combination of visualization and decision support technologies with dynamic interaction features enables the news material management system to perform simulation analysis and scenario prediction of complex information. Users can explore the potential relationships between materials, event evolution paths, and the interactive effects of multimodal content in a virtual environment, thus forming data-driven scenario decision-making capabilities. Through dynamic interaction and simulation analysis, managers can achieve a deep understanding and intelligent control of massive news materials, providing innovative application models for the information management system.

Conclusion

This paper systematically analyzes the digital, multimodal, and dynamic characteristics of new media news materials and proposes an information management system based on artificial intelligence, cloud computing, and big data technologies. The system covers multiple aspects such as multisource collection, intelligent storage, cross-modal classification, semantic annotation, content association, and knowledge mining. The study shows that intelligent management not only improves material processing efficiency and information integration capabilities but also provides a reliable foundation for trend analysis, content optimization, and decision support. In the future, news material management can further integrate edge computing, machine learning adaptive optimization, and virtual reality visualization technologies to achieve real-time dynamic management, cross-platform collaboration, and intelligent recommendations, thereby promoting the development of the news material information management system toward greater efficiency, intelligence, and knowledge-driven approaches, providing innovative technological support for news production and dissemination in the new media environment.

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