Research on Upgrade and Transformation Strategies for Converged Media Production and Broadcasting Systems (Postprint)

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Abstract

This article briefly introduces the fundamental characteristics of current media convergence broadcasting and production systems, explores upgrade and transformation strategies for media convergence live broadcasting systems in conjunction with practical development trends of media convergence, enhances the intelligence and automation levels throughout all processes of media production, and addresses aspects including news gathering, news writing, news review, data analysis, intelligent management, data storage, and automatic monitoring, thereby effectively driving the improvement and optimization of media convergence broadcasting and production systems in the new era.

Full Text

Research on Upgrade Strategies for Converged Media Production and Broadcasting Systems

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Abstract: This article briefly introduces the basic characteristics of current converged media production and broadcasting systems, discusses upgrade strategies for converged media live broadcasting systems based on actual development trends, and proposes enhancements to the intelligence and automation of all processes in media production. By addressing aspects such as news gathering, news writing, news review, data analysis, intelligent management, data storage, and automatic monitoring, we can effectively promote the improvement and optimization of converged media production and broadcasting systems in the new era.

Keywords: converged media; production and broadcasting system; artificial intelligence; blockchain; upgrade and transformation

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We have entered the era of converged media, where the deep integration of emerging technologies such as blockchain and artificial intelligence has provided audiences with broader information selection channels. Against this backdrop, converged media production and broadcasting systems must transform and upgrade to comprehensively enhance their automation and intelligence levels, thereby effectively meeting the evolving demands of the times.

1.1 Converged Media Production and Broadcasting System Architecture

Current converged media production and broadcasting systems in China' s television stations primarily consist of six subsystems: information collection, intelligent control, integrated production, security protection, data storage platform, and integrated editing platform. The integrated editing platform plays a pivotal role in the entire system, responsible for collecting, editing, and transmitting relevant data information. It serves as a critical link connecting other systems and can be further divided into several modules: content production, book publishing, content aggregation, resource management, command and dispatch, and resource management.

The content aggregation module comprehensively integrates all materials required for product manufacturing. The content production module produces various audio-visual and graphic information. The resource management module manages and controls media asset content comprehensively. The book publishing module manages all aspects of the book publishing process. The command and dispatch module dynamically supervises and controls the progress of various business operations.

The information collection subsystem primarily functions to receive audio and video signals, gather online news, and integrate photography and recording materials. The integrated production subsystem mainly produces and manufactures all-media content, playing a crucial role in the production of related audio-visual products. It can be divided into program recording systems and all-media studio systems. The intelligent control subsystem' s main function is to monitor and control the specific status of different subsystems and existing broadcast transmission systems, making appropriate adjustments based on

actual requirements.

The security protection subsystem ensures the safe and stable operation of converged media live broadcasting systems, meeting the relevant requirements of China' s national cybersecurity level three protection system. It can be divided into cloud security protection centers and cloud security management centers, providing comprehensive security protection for converged media live broadcasting systems from various levels including basic networks, technical environments, and boundaries.

The data storage platform provides accurate and reliable data information support for the entire converged media production and broadcasting system. It can be divided into private cloud and public cloud, comprising core network platforms, resource storage zones, and resource computing zones.

1.2 Data Flow in Converged Media Production and Broadcasting Systems

As shown in Figure 1 [Figure 1: see original paper], the information collection subsystem fully leverages network hot news collection and analysis systems as well as recording and interview systems to gather corresponding materials from the extensive internet and other media in the market, transmitting them to the integrated editing platform and integrated production subsystem. At this point, the integrated editing platform integrates, analyzes, edits, and processes the acquired data information to generate corresponding program packages. These program packages display compatible formats for different dissemination carriers, effectively catering to diversified information acquisition needs.

The integrated production subsystem edits, records, and produces audio, video, and graphic materials, thereby generating the data information required by radio and television stations. Subsequently, the intelligent control subsystem receives the audio-visual and graphic information transmitted by the integrated production subsystem, the news display signals transmitted by the integrated editing platform, the equipment monitoring signals transmitted by the broadcast system, and the equipment status from the security protection subsystem. Based on this information, it carries out comprehensive intelligent management and monitoring throughout the entire process.

After the relevant data information is successfully transmitted and broadcast, the data storage platform stores this information for future reference and utilization. During operation, the converged media production and broadcasting system can obtain required data resources, network resources, and computing resources from the data storage platform, thereby comprehensively integrating and consolidating different business subsystems. The security protection subsystem primarily provides data, physical, content, network, and communication-level security protection for the entire converged media production and broadcasting system.

2. Current Development Trends in Converged Media Construction

2.1 Transition from "Converged Media" to "Intelligent Media"

As the development of converged media accelerates, various modern media have gradually integrated deeply with artificial intelligence, giving rise to a new form of intelligent media. Through the application of intelligent media, information dissemination channels can be significantly expanded, information dissemination levels enriched, and information dissemination becomes more personalized and precise. Against this backdrop, converged media construction is gradually shifting from "converged media" to "intelligent media." In the process of producing and releasing relevant content, media no longer rely solely on manual collection and editing but have formed a new AI production mode led by humans and assisted by machines.

By fully leveraging the advantages of intelligent tools, improvements and optimizations have been achieved in various stages including news collection, audio-visual and graphic production, review and release, management, and evaluation. For instance, all-media information recognition technology significantly enhances the efficiency of media asset library resource review and reduces labor costs. Smart chart video production tools and script-to-video tools simplify complex video production steps, reducing the workload of relevant personnel. By fully utilizing advanced artificial intelligence technologies such as machine learning, knowledge graphs, data mining, and search technology[3] to deeply analyze and process acquired data information, news template matching models can be constructed. Content intelligent review systems are similar to antivirus software in principle; after information products are uploaded, they can effectively identify specific individuals, detect violent and terror-related content, accurately proofread manuscripts, and comprehensively enhance review effectiveness.

2.2 Innovative Technologies Empowering High-Speed Development of the Media Industry

We have entered the information age, where advanced technologies such as artificial intelligence, mobile internet, 4K/8K, big data, and 5G have been widely applied. These innovative technologies have created a favorable environment for media convergence and transformation.[2] In particular, the application of blockchain technology in the media industry can significantly enhance dissemination effectiveness, making disseminated content more authentic and reliable. Users can obtain higher-quality audio-visual and graphic content and enjoy a better information acquisition experience. Through the deep integration of blockchain and intelligent media, media dissemination can achieve higher quality, realize personalized recommendations for different audiences, fully meet the constantly changing demands of the era, and thereby achieve the goal of "1+1>2."

3. Upgrade Strategies for Converged Media Production and Broadcasting Systems

Currently, most radio and television stations' converged media production and broadcasting systems in China generally suffer from the following problems. First, the intelligence level is relatively low. Whether in information production, review, or release, operations rely on numerous technical personnel, resulting in relatively low efficiency. Second, when conducting topic selection, planning, and release for broadcasting, video, and new media, management still follows channels, departments, and frequencies in a step-by-step manner, leading to numerous repetitive tasks. The integration level of converged media production and broadcasting systems does not meet relevant standards, seriously reducing operational efficiency. Third, information dissemination precision is relatively low, making it impossible to accurately push personalized content catering to specific audiences, and there is a lack of deep integration with advanced technologies such as blockchain and artificial intelligence.

To effectively solve these problems, we can start from the following aspects.

3.1 Enriching Information Collection and Editing Sources

Relevant staff can improve and optimize the previous public opinion hot news collection and analysis system, fully leveraging the advantages of new media technology and organically combining it with artificial intelligence to generate new algorithms. This enables comprehensive integration and unified analysis of text, images, audio, video, and other materials, thereby broadening information collection and editing source channels. The optimized news collection and analysis system should have strong personalized subscription capabilities and intelligent material retrieval capabilities, providing solid data support for information producers and comprehensively enhancing material quality while reducing the time and effort editors spend on material collection and topic searching.

3.2 Introducing Advanced Production Tools

We can introduce production tools with rich templates, simple operation, and excellent effects into the converged media production and broadcasting system, such as image-to-video tools, intelligent short video production tools, Excel-to-video tools, and script-to-video tools. Simultaneously, we should fully leverage advanced artificial intelligence technologies such as machine learning, knowledge graphs, data mining, and search technology[3] to deeply analyze and process acquired data information and construct news template matching models. Based on corresponding algorithms, we can quickly complete news manuscripts with clear themes and smooth logic, thereby significantly improving news production efficiency.

3.3 Introducing "Machine + Human" Intelligent Review

Based on the actual development of radio and television stations' editing, reviewing, and broadcasting businesses, we can add intelligent content to the current three-level manuscript review system to optimize the traditional manual review mode, improving review efficiency while comprehensively ensuring propaganda content quality. During the review process, machines first conduct preliminary reviews, followed by human review. This enables comprehensive review of content in various forms such as manuscripts, videos, audio, graphics, and comics, effectively detecting pornographic, violent, and terror-related content, identifying specific individuals, and alerting sensitive events mentioned in the content. Staff can then make appropriate adjustments to news content accordingly to ensure compliance with relevant standards.

3.4 Building an Intelligent Matching Release Mode

We can improve and optimize the previously single release method to enhance the information release level of converged media production and broadcasting systems, making information release more diversified, intelligent, and precise. Specifically, we can upgrade technical capabilities in digital broadcasting, social media placement, vehicle 5G, DRM digital broadcasting, and other areas to achieve the effect of automatically adapting one piece of information to multiple release channels, eliminating the need to spend significant time and effort on information conversion between different platforms. Moreover, the intelligent matching release mode can provide news producers with accurate data references when conducting dissemination planning, recommend optimal release channels, and predict potential actual effects.

3.5 Enhancing Data Analysis Depth

Relevant technical personnel can enable converged media production and broadcasting systems to achieve higher computing levels through reasonable channels, organically integrate them with blockchain technology, and expand blockchain management systems to enable distributed collaborative review and precise recommendation. This makes the underlying indicator data information more reliable and user profiling more accurate.[4] When evaluating dissemination effectiveness, we can achieve effective granularity refinement through methods such as secondary forwarding tracking, intelligent assessment reports, and user comment tracking, making dissemination effectiveness evaluation results more objective. Based on precise content and refined user profiling, we can conduct connected push and intelligent adjustment, enabling not only point-to-point push but also group push.

3.6 Strengthening Supervision and Management, Enhancing Storage Effectiveness

The intelligent broadcast control subsystem in converged media production and broadcasting systems must be optimized and upgraded to meet relevant requirements. Technical personnel can organically combine intelligent broadcast control systems with advanced technologies such as intelligent scheduling, AI broadcasting, and intelligent dispatching to comprehensively enhance information release levels and improve information release efficiency. By upgrading fault traceability analysis, automated inspection, security redundancy, intelligent emergency handling, and operation and maintenance management, the system can achieve better overall performance and ensure stable operation. Breaking the constraints faced by various links in the business process and improving the connection degree between different functional modules enables full lifecycle management of information products.

To enable the media asset library to have more powerful storage effectiveness, we can introduce AI processing engines, AI intelligent cataloging, multilingual management, and multimodal intelligent retrieval. This enables task recognition, classification annotation, and AI analysis of various graphic, audio, and video materials, giving the converged media production and broadcasting system strong intelligent automatic cataloging capabilities and high-speed retrieval capabilities. It also enables automatic inclusion of broadcast program media playlists and published information into the media asset library. By fully leveraging artificial intelligence technology to comprehensively integrate and process audio, video, and graphic information stored in the media asset library and conduct tagging, subsequent retrieval, reference, and utilization become more convenient. Through this approach, staff workload is relatively low, requiring only review and inspection responsibilities without needing to conduct full-process storage operations.

To strengthen supervision and management of converged media production and broadcasting systems, we have designed a new monitoring platform based on specific requirements, primarily aimed at reducing cost investment and supported by blockchain distributed processing, data stream processing, and machine autonomous learning technologies. The new monitoring platform will deploy corresponding collectors in various subsystems of the converged media production and broadcasting system to collect various types of data information and transmit it in encrypted form to the monitoring database of the converged media production and broadcasting system. The monitoring database will structurally process this data information to provide accurate data references for subsequent upper-layer analysis.[5]

Specifically, the monitoring platform is divided into four layers: presentation layer, function layer, data processing layer, and data source layer. The presentation layer's main function is to enable technical personnel to obtain specific data statistics, including modules such as real-time alarm consoles, knowledge bases,

business status monitoring, data statistics consoles, and service desks. The function layer enables technical personnel to conduct analysis, monitoring, and early warning operations according to actual requirements, including modules such as asset management, incident management, release management, work planning, configuration management, problem management, design tools, change management, knowledge base management, service level management, operation management, service desk, shift management, third-party product adjustment, and service catalog. The data processing layer collects and processes relevant data information and sets up corresponding machine room management platforms, business monitoring platforms, hardware monitoring management platforms, and virtual environment management platforms for performance data, business data, alarm data, and configuration data, using the CDMB logical database to complete data collection, analysis, and processing. The data source layer integrates various monitored objects, including middleware, machine room power environments, servers, databases, virtual resources, business systems, special equipment, networks, and business data. The entire monitoring platform adopts a multi-layer distributed J2EE architecture, with a pure B/S architecture as the main presentation method for pages, enabling clear display on both the internet and local area networks.[6] Through the application of the monitoring platform, the converged media production and broadcasting system can receive comprehensive supervision and control during operation, effectively preventing improper operations in various links and ensuring the quality of media products.

Conclusion

In summary, we have entered the era of converged media. To effectively promote deep integration between media, we should comprehensively consider the development needs of the era, improve and optimize existing converged media production and broadcasting systems, and comprehensively enhance their intelligence level. Only in this way can we effectively improve news information production efficiency and ensure news information quality.

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