

Research on the Application and Future Development of Artificial Intelligence in the Exhibition Industry

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Abstract

With the rapid development of artificial intelligence (AI) technology, its application in the exhibition industry is becoming increasingly widespread, profoundly changing the traditional exhibition mode. This article aims to explore the current application status, advantages, challenges, and future development trends of artificial intelligence in the exhibition industry, providing reference for the digital transformation of the exhibition industry. Through case analysis, technical analysis, and trend prediction, this article reveals how artificial intelligence can improve exhibition efficiency, optimize exhibition experience, and promote industry innovation.

Keywords Artificial Intelligence; Exhibition industry; Future development; Response measures

1 Introduction

As an important component of modern service industry, the exhibition industry plays a crucial role in promoting economic exchanges, cultural dissemination, and technological innovation. It is an important platform that connects production and consumption, promotes economic and trade exchanges, and its development is closely related to technological progress. However, the traditional exhibition mode faces problems such as low efficiency, high cost, and poor customer experience. With the rise of artificial intelligence technology, the exhibition industry has ushered in new development opportunities. This article aims to explore the current status, challenges, and future prospects of the application of artificial intelligence technology in the exhibition industry, providing reference for the intelligent transformation of the exhibition industry.

2 The Current Application Status of Artificial Intelligence in the Exhibition Industry

Artificial intelligence has been widely applied in fields such as voice assistants, industrial robots, medicine, and autonomous driving.[1] Next Move Strategy Consulting predicts that the global artificial intelligence market will reach \$1847.58 billion by 2030, with an average annual growth rate of 32.9% from 2022 to 2030.[2] In the industry, the application of artificial intelligence is also quite extensive, covering various aspects from exhibition preparation, on-site management to follow-up, and the application scenarios are showing a diversified trend. At present, the application of artificial intelligence technology in the exhibition industry can be summarized into the following four aspects.

2.1 Intelligent Customer Service

Intelligent customer service systems are typically built on deep learning algorithms, capable of understanding and generating human language, and are one of the most widely used areas of artificial intelligence in the exhibition industry. On the one hand, through the training of large models, intelligent

customer service can accurately understand customers' queries, complaints, or suggestions, and respond to visitors' consultation needs in real time in the form of natural language, providing personalized services. For example, the intelligent customer service robot "Xiaoi Robot" at the 2019 China International Import Expo provided professional consulting services for visitors, greatly enhancing the exhibition experience. It can answer exhibitors' booth information, exhibit introductions, and other questions, improving exhibition service efficiency. On the other hand, intelligent customer service presented in the form of robots can not only improve exhibition efficiency, but also reduce labor costs, enhance the exhibition experience, and provide visitors with comprehensive services by undertaking more interactive tasks such as guided tours and performances. For example, at the 2024 World Artificial Intelligence Conference, multiple humanoid robots were able to perform dances and interact with audiences, adding fun and interactivity to the exhibition.

2.2 Biometric Recognition Technology

Biometric recognition technology is a high-tech means of identity verification by identifying an individual's biological characteristics. It combines computer technology, optical technology, acoustic technology, biosensors, and principles of biostatistics, utilizing the inherent physiological characteristics of the human body (such as fingerprints, irises, facial features, etc.) and behavioral features (such as voice, gait, signatures, etc.) to authenticate personal identity. Among them, the application of facial recognition technology in the exhibition industry is mainly reflected in entrance management, security monitoring, and other aspects. By quickly identifying the facial features of visitors, contactless entry can be achieved, improving entry efficiency. Meanwhile, facial recognition technology can also be used to identify suspicious individuals and ensure the safety of exhibitions. For example, in important exhibition events, facial recognition systems can effectively prevent illegal intrusion and security incidents from occurring. In addition, by detecting the behavioral characteristics of visitors, dangerous events and abnormal behaviors in the exhibition hall can be identified.

2.3 Virtual Reality and Augmented Reality Technology

The first two technologies are mainly applied in exhibition venues, and artificial intelligence technology can also be used to empower in the virtual world, transferring exhibition venues from the real world to virtual spaces, allowing visitors to experience the immersive feeling without leaving their homes. The use of virtual reality and augmented reality technology can bring new display methods to the exhibition industry. Through virtual reality technology, exhibition designers can simulate the layout of the exhibition hall on a computer and understand the effect of the exhibition hall in advance; Meanwhile, visitors can freely browse the exhibits in a virtual environment through virtual reality technology, gaining an immersive viewing experience.[3] Augmented reality technology can overlay virtual information onto the real world, providing visitors with a richer interactive experience. For example, in cultural relic exhibitions, augmented reality technology can present the historical background, production techniques, and other information of cultural relics in virtual form to visitors, enhancing the display effect of exhibits.

2.4 Personalized Recommendations

The application of artificial intelligence in the exhibition industry has had a profound impact on the industry. It not only improves the efficiency and service level of exhibitions, reduces labor costs, but also stimulates the innovation vitality of the exhibition industry. For example, through artificial intelligence technology, exhibition organizers can more accurately understand the needs and preferences of visitors, thereby providing more personalized services.[4]

In summary, the current application status of artificial intelligence in the exhibition industry presents characteristics of universality, diversity, innovation, and profound impact. With the continuous advancement of technology and the expansion of application scenarios, the application prospects of artificial intelligence in the exhibition industry will be even broader, bringing greater opportunities and challenges to the development of the exhibition industry.

3 The Advantages, Effects, and Potential Risks of Artificial Intelligence in the Exhibition Industry

From a technical perspective, the application forms of artificial intelligence in the exhibition industry are diverse, but due to the difficulty of technological integration, technological innovation still faces significant challenges; From an economic perspective, due to high initial costs and uncertain economic benefits, some application scenarios cannot be replicated and promoted on a large scale. Therefore, we need to objectively and comprehensively analyze the intrinsic mechanisms of artificial intelligence and its advantages, effects, and potential risks for the development of the exhibition industry.

3.1 Analysis of the Advantages of Artificial Intelligence Empowering the Exhibition Industry

As a digital technology that combines universality, foundation, and enablement, artificial intelligence has the potential to integrate with various industries, production, and daily life in the economy and society. [5] This is manifested as a powerful spillover effect. In the exhibition industry, its spillover advantages can be summarized as follows.

1) Improve exhibition efficiency and reduce labor costs

In terms of efficient design and planning, artificial intelligence technology can accurately grasp the interests, preferences, behavior patterns, and information reception habits of target audiences through big data analysis, helping designers to scientifically plan exhibition layout, select display content, and quickly generate high-quality marketing copy and short videos, improving the efficiency and effectiveness of exhibition promotion. For example, using artificial intelligence painting generation tools can significantly improve the efficiency and innovation of booth design, ensuring compact and fast-paced promotional content, highlighting the highlights and characteristics of the exhibition.

In terms of automated process management, artificial intelligence technology can automate many repetitive and inefficient tasks in exhibitions, such as audience registration, information filtering and classification, intelligent report generation, etc., thereby reducing manual burden and improving exhibition operation efficiency. According to experimental results, the design efficiency using artificial intelligence technology has increased by more than 20% compared to traditional design methods. [6]

In terms of reducing labor costs, the application of artificial intelligence technology can replace some human work and effectively reduce labor costs in the exhibition industry. For example, intelligent robots can undertake tasks such as reception and guidance, reducing human input; Intelligent customer service can automatically handle a large number of consultation requests, reducing the workload of manual customer service.

2) Enhance the exhibition experience and audience engagement

The application of artificial intelligence technology provides visitors with a more comfortable and intelligent exhibition experience. Through more user-friendly human-computer interaction, visitors can easily access information, experience exhibits, and participate in effective interaction, thereby enhancing their satisfaction and sense of achievement with the exhibition.

Firstly, artificial intelligence technology can collect user data from multiple channels, such as exhibition apps, social media, search engines, etc., providing comprehensive data support for exhibition marketing. Further conduct in-depth mining on the collected user data, construct user profiles for exhibitors and visitors, and achieve precise marketing promotion. Provide personalized exhibition information, exhibit recommendations, and related activity introductions based on the audience's interests, preferences, and behavior patterns, thereby enhancing the audience's exhibition experience. For example, through techniques such as sentiment analysis, customized exhibition content recommendations can be provided to the audience to ensure that they see the most interesting content at the exhibition.

Secondly, by combining augmented reality and virtual reality technologies, artificial intelligence can create immersive display experiences. Viewers can enter simulated environments through VR devices, experience product usage scenarios, or see 3D models and dynamic effects of products in real environments through AR technology. This technology not only deepens the audience's impression, but also enhances the brand's innovative image.

Finally, in terms of real-time interaction and feedback, artificial intelligence technology can achieve real-time interaction between audiences and exhibitors, such as online Q&A, virtual tours, etc., to enhance audience participation and satisfaction.

3) Enhance the security and convenience of exhibitions

Safety and convenience are often contradictory, and as the safety of an exhibition increases, the convenience decreases, and vice versa. The advantage of artificial intelligence technology in the exhibition industry lies in its ability to perfectly solve this contradiction problem.

From the perspective of security monitoring, facial recognition technology can assist security personnel in quickly identifying personnel identities, effectively preventing security accidents, and improving the security of exhibitions through blacklist warning functions. At the same time, big data analysis technology can be combined to monitor the crowd density and abnormal situations at the exhibition site in real time, issue timely warnings and take measures to ensure the smooth progress of the exhibition. From the perspective of convenient services, the above process is imperceptible to exhibitors, and they can also easily obtain exhibition information, handle check-in, entry and other procedures through technological means such as QR codes and smart mobile clients, improving the convenience of exhibition services.

4) Promote innovation and development in the exhibition industry

The application of artificial intelligence technology has stimulated the innovation vitality of the exhibition industry. From the perspective of technology empowering endogenous power, by introducing new technologies and models, the exhibition industry continues to innovate. Coupled with the integration of artificial intelligence, big data, cloud computing and other technologies, it will promote the intelligence and automation of the exhibition design process, bringing more innovative possibilities to the exhibition industry. For example, innovative models such as virtual exhibitions and intelligent business matching based on artificial intelligence are gradually emerging, which may give rise to new business models and service forms. [7] From the perspective of radiating industry innovation, artificial intelligence technology has stimulated the innovation vitality of the exhibition industry by bringing new ideas and solutions, promoting the development and transformation of the industry. At the same time, it will also promote the integration and development of the exhibition industry with other industries, such as "conferences, exhibitions, festivals, competitions, performances, and tours", providing a deep soil for the artificial intelligence industry. [8]

3.2 Risks and Challenges Faced by Artificial Intelligence in the Exhibition Industry

Artificial intelligence has many advantages in the exhibition industry, which will promote its sustainable development and bring revolutionary changes. However, just as there are universal risks in empowering various industries with artificial intelligence, it also brings undeniable risks and challenges to the exhibition industry.

1) Data security and privacy protection issues

The application of artificial intelligence technology involves the collection and processing of a large amount of personal data. How to ensure data security and protect personal privacy has become an important challenge facing the exhibition industry. [9]

In terms of data leakage risk, the application of artificial intelligence in the exhibition industry often requires the collection of a large amount of data from exhibitors, visitors, and exhibition organizers, including sensitive information such as personal information and transaction records. Once these data are leaked, it will cause serious privacy violations and economic losses to individuals and businesses; In terms of network security threats, artificial intelligence systems often rely on network connections, which makes them more vulnerable to cyber attacks. Hackers may attack artificial intelligence systems in the exhibition industry through malicious software, phishing attacks, and other means, stealing data, disrupting services, or committing other malicious acts.

2) Technical maturity and reliability issues

At present, the application of artificial intelligence technology in the exhibition industry is still in the exploratory stage, and the maturity and stability of the technology need to be improved. For example, intelligent customer service systems may experience response delays or incorrect responses in high concurrency scenarios, which can affect the exhibition experience. At the same time, although the integration and innovation of artificial intelligence with technologies such as the Internet of Things, big data, and cloud computing have brought more possibilities to the exhibition industry, it has also increased the difficulty of technological implementation. This may lead some exhibition industry practitioners to hold a conservative attitude towards the innovative application of artificial intelligence technology, lacking sufficient innovation motivation and exploratory spirit, resulting in the exhibition industry stagnating in the application of artificial intelligence technology and unable to fully realize its potential.

In addition, artificial intelligence algorithms may be affected by data bias during the training process, leading to bias in the algorithm itself. When artificial intelligence algorithms are applied to key processes such as exhibition recommendations and audience analysis, this potential algorithmic bias may become apparent, posing a challenge to the fairness and accuracy of exhibitions. For example, in an exhibition recommendation system, if the historical data used for algorithm training is biased towards certain specific types of exhibitors or audience groups, the recommendation results may unconsciously lean towards these groups, thereby ignoring other potentially valuable opportunities for exhibitions or visits. This not only limits the diversity and inclusiveness of exhibitions, but may also exacerbate information asymmetry within the industry, affecting the satisfaction and participation of exhibitors and visitors.

Similarly, in visitor analysis, algorithmic bias may lead to misunderstandings or misjudgments of visitor behavior. For example, behavior prediction models trained on biased data may incorrectly evaluate the interests, preferences, or consumption potential of certain groups, thereby affecting the optimization decisions of exhibition organizers regarding exhibition content, layout, or services. In the long run, this deviation may hinder the innovative development of the exhibition industry, reducing its sensitivity and responsiveness to market changes.

3) High threshold and resource investment issues

Building and maintaining an artificial intelligence system requires high costs, including hardware equipment, software development, personnel training, etc. For small exhibition companies or startups, this is an unbearable burden. Artificial intelligence systems require regular updates and maintenance to ensure their normal operation and security, which also requires continuous investment of funds and resources.

In addition, although the application of artificial intelligence in the exhibition industry has broad prospects, its economic benefits still have certain uncertainties. Some exhibition industry practitioners may adopt a wait-and-see attitude towards the investment return of artificial intelligence technology, fearing that it may not bring the expected economic benefits.

4 Future Development Trends and Countermeasures of Artificial Intelligence in the Exhibition Industry

With the rapid development of artificial intelligence technology, the exhibition industry is undergoing a profound transformation, and its future development trend will present characteristics of personalization, intelligence, and efficiency. Therefore, the exhibition industry should also plan ahead and propose corresponding strategies to cope with these development trends.

4.1 Personalized Needs and Brand Building

With the increasing diversification of consumer demands, personalized services will become the mainstream trend in the exhibition industry. [10] In the future, exhibition organizers can use artificial intelligence technology to develop personalized recommendation algorithms and brand building tools suitable for the exhibition industry, empowering the exhibition industry to achieve real-time analysis of participant data, understand their interests and preferences, and develop more personalized service plans. At the same time, the application of natural language processing and computer vision technology can enable brands to better understand the evaluations and feedback of attendees, optimize exhibition layout and display content, and enhance brand building effects. [11]

In the process of using artificial intelligence technology to collect and analyze data, it is necessary to strictly comply with relevant laws, regulations, and privacy policies to ensure the security and privacy of user data. Strengthen data encryption and access control to prevent data leakage and abuse. [12]

4.2 Integration and Development of Virtual and Physical Exhibitions

Virtual exhibitions have advantages such as not being limited by geography and low cost, while physical exhibitions can provide a more authentic communication experience. In the future, virtual exhibitions and physical exhibitions will integrate and develop, forming a new mode of exhibition that combines online and offline. On the one hand, the application of AI painting generation tools in virtual exhibition booth design will greatly enhance the efficiency and innovation of booth design. Utilize historical data to optimize design elements such as layout, color, and interactivity, creating a unique display space. On the other hand, AI combined with AR and VR technology can create immersive display

experiences. Viewers can enter simulated environments through VR devices or see 3D models and dynamic effects of products in real environments through AR technology, enhancing the attractiveness of the exhibition.

Faced with the trend of virtual real integration, the exhibition industry should actively practice the concept of sustainable development and promote green, low-carbon, and environmentally friendly exhibition methods. By introducing technologies such as intelligent scheduling and virtual reality, resource waste and environmental pollution can be reduced. At the same time, the exhibition industry should strengthen cooperation and exchanges with the international community to jointly promote the sustainable development process of the global exhibition industry.

4.3 The Level of Intelligence Continues to Improve

With the continuous maturity of artificial intelligence technology and the expansion of application scenarios, the intelligence level of the exhibition industry will continue to improve. In the future, more intelligent and automated solutions will be applied to various aspects of the exhibition industry.

One is intelligent content production and marketing. AI can quickly generate promotional copy, short videos, and other exhibition content, improving promotional efficiency and effectiveness. Intelligent editing and special effects addition make videos more vivid and interesting, enhancing the audience's viewing experience. Optimize advertising content and format through big data analysis, use intelligent algorithms to predict target audience preferences, and achieve precise marketing.

The second is intelligent business matching services. AI technology can deeply analyze exhibition data, identify potential matching relationships between users, and provide accurate business matching services for exhibitors and visitors. The intelligent matching algorithm considers multiple dimensions to ensure the accuracy and effectiveness of business matching.

The third is intelligent management and services. The AI intelligent customer service system can provide a consistent and continuous service experience across platforms, improving user convenience and satisfaction. Virtual customer service provides personalized services to users through intelligent dialogue interaction. The application of facial recognition technology on exhibition sites can improve entry efficiency and enhance exhibition security. By monitoring crowd density and analyzing participant behavior, organizers can adjust their entry strategies and optimize the exhibition layout in a timely manner.

4.4 Cross Industry Cooperation and Collaborative Innovation

The application of artificial intelligence technology in the exhibition industry requires cross industry cooperation and collaborative innovation. In the future, the exhibition industry will deeply integrate with industries such as technology, culture, and tourism to jointly promote innovation and development in the exhibition industry.

On the one hand, the exhibition industry needs to cultivate a talent team with cross-border integration capabilities to meet the needs of cross industry cooperation. By strengthening talent cultivation and introduction work, we aim to enhance the professionalization and innovation capabilities of the exhibition industry. At the same time, the exhibition industry should strengthen cooperation with universities and research institutions to jointly cultivate composite talents with the ability to apply new technologies such as artificial intelligence, big data, and the Internet of Things. [13]

On the other hand, from the perspective of regulatory regulation of artificial intelligence, given the complexity and rapid development of AI, regulatory agencies often lack the necessary resources, professional knowledge, and technical tools to effectively supervise the risks brought by AI systems. [14] Therefore, it is necessary to invite experts from multiple disciplines such as AI and law to participate in the regulatory process. Corresponding management regulations should be formulated for the application of artificial intelligence in the exhibition industry, or comprehensive laws covering all applications of a given technology should be formulated with reference to the EU's Artificial Intelligence Act, to guide the collaborative innovation and healthy development of artificial intelligence technology in the exhibition industry.

5 Conclusion

The application of artificial intelligence in the exhibition industry has achieved significant results, bringing many conveniences to exhibition organizers, exhibitors, and visitors. In the future, with the continuous advancement of technology and the expansion of application scenarios, artificial intelligence will play a more important role in the exhibition industry. However, facing challenges such as data security, technological maturity, and talent shortage, the exhibition industry needs to adopt proactive and effective response strategies to promote the healthy and sustainable development of the industry.

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