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AI Big Model Enabling High Quality Development Logic, Mechanism and Path of Sports Industry

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Abstract

With the arrival of the "Artificial Intelligence +" era, the application of generative AI big model technology in the sports industry has become more and more widespread, injecting new vitality into the high-quality development of the industry. This study aims to explore the development logic, mechanism and path of the sports industry in the context of the "AI+" era, and analyzes the significant potential of AI big model technology in improving decision-making efficiency, optimizing resource allocation and enhancing user experience. Through literature review, case analysis and other methods, the technical path, industrial application path and policy guidance path of generative AI big model in sports industry are elaborated in detail. At the same time, this paper also reveals potential obstacles such as technical challenges and social and ethical issues, and puts forward reasonable (targeted) countermeasure suggestions. Finally, this paper looks forward to the future application of AI big model technology in the sports industry and points out the future research direction, with a view to providing theoretical guidance and practical reference for the intelligent transformation and sustainable development of the sports industry.

Keywords

Ai big model, sports industry, decision support, intelligence, policy path.

1. INTRODUCTION

In 2024, the government work report proposed for the first time to carry out the "artificial intelligence +" action, and a number of measures for the over-construction of digital infrastructure, the optimal allocation of arithmetic resources, and the construction of industrial clusters and pilot zones have been planned one after another, and the AI big model technology has gradually become an important driving force for the transformation of the sports industry. As a comprehensive industry covering multiple fields such as entertainment, health, and technology, the development trend of the sports industry is being profoundly affected by intelligent transformation. The scale of the global sports industry continues to expand, and the market segmentation is becoming more and more fine, from traditional sports events, fitness and entertainment, to emerging e-sports and virtual sports, all of which are actively exploring technological innovation to enhance their competitiveness and market attractiveness

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(presenting the popular trend of a hundred flowers blossoming and a hundred schools of thought contending to enhance their competitiveness and market attractiveness with the posture of innovation).

1.Research Background

At present, from the basic layer, the framework layer, the model layer to the application layer, China's artificial intelligence whole industry chain system is accelerating the construction and improvement, and the generative AI big model injects new kinetic energy into the high-quality development of the sports industry. The big model can empower all levels of the sports industry in an all-round way through deep learning and big data analysis technology. From the research and development of intelligent sports equipment, in-depth analysis of sports performance, to the construction of action models and the innovation of virtual broadcasting technology, the integration of AI technology is profoundly reshaping the operation mode of the sports industry. For example, the cooperation between Shangtang and Shanghai Sport University (Hepu Zhuyu Tire) has successfully developed a professional sports performance analysis product for basketball. The product is capable of interpreting athletes' performance in real time, helping coaching teams to improve training effectiveness and optimize competitive strategies. In addition, the application of AI big model technology in the fields of live broadcasting of sports events, media content creation, and virtual advertising implantation is also greatly improving the audience's viewing experience and meeting the diversified needs of communication forms in the new media era.

2.Research Significance

The importance of generative AI big model technology in promoting the high-quality development of the sports industry is reflected in the following aspects:

(1) Enhance decision-making efficiency: generative AI big model has powerful data processing capabilities, providing accurate support for decision-making (providing users with all-round decision-making suggestions), helping coaches and sports administrators to develop scientific and reasonable training programs and game strategies, and the real-time data analysis function of the model can instantly present game performance and tactical suggestions, helping athletes and coaches to achieve flexible adjustments in the game and optimize the Athletic performance optimization.

(2) Optimize resource allocation: The generative AI model can deeply excavate the training data and performance of athletes, realize the fine allocation of training resources, and ensure that each athlete can get the best training plan tailored to his/her needs. At the same time, relying on accurate data analysis and scientific prediction models, the big model helps sports organizations optimize operation and management, reduce operating costs, improve resource utilization efficiency, and inject new vitality into the vigorous development of sports. (Through accurate data analysis and scientific prediction, the Big Model optimizes the operation and management of sports organizations, reduces costs, improves resource efficiency, and promotes the development of the sports industry.)

(3) Enhance user experience: generative AI big models can create exclusive sports content, such as tailored training programs, personalized events and other customized services based on user preferences and historical data. Utilizing the in-depth integration of virtual reality (VR) and augmented reality (AR) technologies, an immersive viewing experience can be created, which greatly enhances the audience's enthusiasm for participation and interactive effects.

The expected impact is mainly reflected in the enhancement of the operational efficiency of the sports industry, the promotion of the innovative development of sports products and services, and the significant enhancement of the international competitive strength of the sports industry.

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3.Research Objectives

This research aims to deeply reveal the logic, mechanism and path of AI big model technology empowering the sports industry. This paper will explore how generative AI big models can improve the decision-making efficiency and accuracy of the sports industry through data-driven and pattern recognition, analyze how big model technology can promote the economic benefits of the sports industry by optimizing resource allocation and reducing costs, and study how big model technology can promote the social value of the sports industry by enhancing user experience and improving participation. Through this systematic research work, we expect to provide solid theoretical support and practical practical guidelines for the high-quality development of the sports industry.

2. LITERATURE REVIEW

1.Current status of research

Under the background of the deep integration of sports industry and artificial intelligence technology, AI big model, as a new driving force to promote the high-quality development of sports industry, has attracted a lot of attention for its research and application status. Studies at home and abroad have shown that the application of AI technology in the field of sports has been expanded from a single data analysis to a variety of aspects such as athlete training, game analysis, intelligent equipment, and live broadcasting of events.

(1) In competitive sports, AI technology is widely used in athlete training and game analysis, providing accurate sports performance analysis and tactical advice through deep learning and big data analysis. For example, the cooperation between Shangtang Technology and the China National Basketball Team has developed a basketball product based on AI big model, which realizes real-time analysis of athletes' on-court performance, and assists the coaching team to improve training efficiency and optimize competitive strategies (Zhu Jing, 2024).

(2) In terms of smart equipment and venues, AI big model technology promotes the development of smart sports equipment and smart stadiums. Through the integration of sensors and wearable devices, it collects athletes' physiological data and sports performance to provide personalized training suggestions for athletes, while providing an immersive viewing experience for spectators (Chengping Zhang, 2024).

(3) In terms of live event broadcasting and spectator experience, the application of AI technology such as through virtual reality (VR) and augmented reality (AR) technology provides a new spectator experience. In addition, AI big models are able to provide multi-perspective tournament analysis and commentary to enhance audience engagement (Liu, Lili et al., 2024).

(4) In the field of fitness and entertainment and education and training, AI big models provide personalized fitness guidance and health management services to promote the popularization and development of national fitness. In education and training, AI big models assist coaches in making training plans, assessing athletes' progress, and even providing tactical analysis and skill training in areas such as e-sports (Jin Binxia et al., 2024).

These applications not only improve the operational efficiency of the sports industry, but also enhance the international competitiveness of the sports industry, as well as provide a new impetus for the innovative development of the sports industry.

2.Research Review

Although the application of generative AI big model technology in the sports industry has made significant progress, it still faces many problems and challenges. The accuracy and reliability of the technology remains a key challenge in the context of restricted data collection. At the same time, data privacy and security issues are becoming increasingly prominent, and

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the sports industry needs to deal with a large amount of personal and sensitive data when applying big models, the leakage or improper use of which may lead to serious consequences. In addition, the rapid development of AI technology is prone to raise social and ethical issues, such as the impact on employment and fairness issues.

The sufficient necessity of the research in this thesis lies in systematically exploring the logic, mechanism and path of AI big model technology empowering the sports industry, analyzing its potential in improving decision-making efficiency, optimizing resource allocation, enhancing user experience, etc., as well as identifying the potential challenges and proposing corresponding countermeasure suggestions. Through this research, this paper expects to provide theoretical guidance and practical paths for the high-quality development of the sports industry, and at the same time provide references for future research directions. Based on the literature review, this study will fill the gaps in existing research, especially in how AI big model technology can improve the efficiency and accuracy of decision-making in the sports industry through data-driven and pattern recognition, as well as how it can promote the economic efficiency of the sports industry by optimizing resource allocation and reducing costs. In addition, this study will also explore how AI big model technology can promote the social value of the sports industry by enhancing user experience and improving participation, providing new perspectives and strategies for the intelligent transformation and sustainable development of the sports industry.

3. THE LOGIC OF AI BIG MODEL TECHNOLOGY TO EMPOWER THE SPORTS INDUSTRY

1.Technical logic

The technical logic of generative AI big model technology in the sports industry is mainly reflected in the two aspects of data-driven and pattern recognition. Data-driven means that AI big model provides scientific basis for coaches, athletes and decision makers by collecting, processing and analyzing a large amount of sports data; while pattern recognition means that AI big model provides decision-making support for all aspects of the sports industry by learning and recognizing patterns and laws in the data. This data-driven and pattern recognition capability greatly improves the efficiency and accuracy of decision-making in the sports industry, allowing resources to be allocated more rationally, thus enhancing overall athleticism and operational efficiency.

2.Economic Logic

From an economic perspective, generative AI big model technology brings economic benefits to the sports industry by optimizing resource allocation and reducing costs. In the operation of sports events, big models can analyze audience data, optimize event arrangements and marketing strategies, and increase ticket sales and commercial sponsorship. In addition, big models can reduce energy consumption through intelligent venue management, and reduce the risk of injury for athletes through accurate injury prediction, thus reducing medical expenses and insurance costs. In sports product manufacturing, the application of AI technology can optimize the production process, improve product quality and reduce production costs. In these ways, AI big model technology not only improves the economic benefits of the sports industry, but also enhances its competitiveness in the market.

3.Social Logic

The social logic of generative AI big model technology in the sports industry is mainly reflected in the enhancement of user experience and participation. The big model technology can provide users with customized fitness plans and health advice through the recommendation system to enhance their sports experience. In live event broadcasting, AI

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technology can provide multi-angle event analysis and commentary to enhance the audience's viewing experience. In addition, AI big models can provide users with an immersive sports entertainment experience through virtual reality (VR) and augmented reality (AR) technologies. The application of these technologies not only improves the social value of the sports industry, but also promotes the dissemination of sports culture and sportsmanship. By enhancing user experience and participation, AI innovation helps build a more active and inclusive sports community and promotes the sustainable development of the sports industry.

4. THE MECHANISM OF AI BIG MODEL TECHNOLOGY EMPOWERING THE SPORTS INDUSTRY

1.Data-driven decision-making mechanism

The data-driven decision-making mechanism of generative AI big model technology in the sports industry is mainly reflected in its ability to collect, process and analyze massive data. It crawls data from different sources with the help of data mining algorithms, including information such as athletes' physiological data, sports performance, event statistics and audience feedback. By applying machine learning and deep learning algorithms, AI Big Model is able to refine effective information, which can help coaches and managers make more effective training plans, help athletes optimize their technical movements and reduce the risk of injury. In terms of tournament management, AI big models can predict tournament results, optimize tournament arrangements, and improve tournament spectatorship and commercial value. In addition, through the statistical analysis of spectator data, big model technology can also help sports organizations better understand the market demand, so as to develop more accurate and effective marketing strategies. Big model technology not only improves the scientificity and accuracy of decision-making, but also provides strong data support for all aspects of the sports industry and promotes the sustainable development and innovation of the whole industry.

2.Intelligent Service Mechanism

Generative AI Big Model improves customer satisfaction and loyalty in the sports industry through intelligent service mechanism. In sports events, the big model uses speech recognition and natural language processing technologies to enhance the personalized viewing experience, and can provide users with real-time event commentary and analysis; it can also use the big model recommendation system to push relevant events and content according to user preferences. In the field of fitness and health management, the generative AI big model can act as a virtual coach, provide users with personalized fitness plans and health advice through text, video and other means, monitor users' sports performance, and adjust training intensity and content in a timely manner. These intelligent services not only improve the user experience, but also enhance the user's loyalty to sports brands and services, thus creating a sustainable competitive advantage for the sports industry.

3.Innovation-driven development mechanism

Generative AI big model technology is an important driving force for innovation and transformation and upgrading of the sports industry. It can provide new ideas and directions for the design and development of sports products through pattern recognition and interactive applications. For example, in the design of sports equipment, AI big models can analyze athletes' sports data and make suggestions to improve the performance of the equipment, helping manufacturers develop products that better meet the needs of athletes. In the presentation of sports events, big models can be combined with virtual reality (VR) and augmented reality (AR) technology to create a new viewing experience and attract more young viewers. In addition, the application of AI Big Model provides a brand new model for sports education and training, providing an immersive learning experience and cultivating more sports talents by simulating real sports scenes. These innovative applications not only promote the technological progress

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of the sports industry, but also provide a new impetus for the sustainable development of the sports industry.

5. THE PATH OF AI BIG MODEL TECHNOLOGY TO EMPOWER THE SPORTS INDUSTRY

1.Technology Path

The technical path of AI big model technology in the sports industry involves multiple stages, including data collection, model training and application deployment. First of all, data collection is the foundation, and it is necessary to collect athletes' physiological data, sports performance, environmental factors, etc. through sensors, wearable devices, video surveillance and other means. These data are cleaned and pre-processed for training AI big models. In the model training phase, machine learning and deep learning algorithms, such as convolutional neural networks (CNN) and recurrent neural networks (RNN), are used to analyze the data, extract features, and build models. The trained models need to be deployed and tested in real-world applications to ensure their accuracy and reliability. For example, in the Shanghai Sports University's cooperation with Baidu on the Shanghai Sports Big Model, it involves the collection and training of specialized sports data, as well as the deployment of the application in the preparation of multiple national teams for the Paris Olympics.

2.Industry Path

The application path of generative AI big models in the sports industry is extensive, covering sports events, fitness and entertainment, education and training, and other fields. In sports events, big model technology can be used for game analysis, athlete performance evaluation, event prediction, etc., to improve the professionalism and management efficiency of the event. In the field of fitness and entertainment, big model technology can provide personalized fitness plans, exercise guidance and health advice to improve user experience. In the field of education and training, big model technology can assist coaches in formulating training plans, evaluating athletes' progress, and even providing tactical analysis and skill training in areas such as e-sports. In addition, AI big models can also play a role in sports equipment design, sports science research, sports marketing and sponsorship, and promote the innovative development of the sports industry.

3.Policy Path

The government plays an important role in the application and development of AI big model technology empowering the sports industry. By formulating relevant policies, the government can guide and support the R&D and application of AI technology. For example, the government can provide financial support to encourage cooperation between sports organizations and technology companies to develop generative AI big model technology. The government can also formulate regulations on data security and privacy protection to ensure the green development of AI technology in the sports industry. In addition, the government can cultivate “AI+Sports” composite talents through education and training policies to provide human resources support for the digital transformation of the sports industry. The government can also incentivize enterprises to invest in AI big model technology through public procurement, tax incentives, and R&D subsidies to promote technological innovation and industrial upgrading in the sports industry. Through these policy paths, the government can effectively promote the widespread application of big model technology in the sports industry and promote the high-quality development of the sports industry.

6. CASE STUDY

Case Studies of AI Big Model Application in Sports Industry at Home and Abroad

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The application cases of AI big model technology in the sports industry keep emerging, showing strong potential and wide application prospects. The following are several

1.representative case studies

(1) The “Shanghai Sports Big Model” released by Shanghai University of Physical Education is the first big model in the sports industry in China, which combines three vertical big models, namely sports literature, action recognition and technical and tactical analysis, and multimodal, and builds 20 intelligences on the Baidu Wenshin Intelligent Body Platform. The model is able to automatically parse videos and images of sports training, and output detection, segmentation, 2D and 3D analysis results of human posture, as well as quantitative metrics such as distance, speed, altitude, angular velocity, etc., which can help with more in-depth biomechanical analysis. In addition, it integrates information from text, voice, video, and 3D to provide professional answers to sports questions and analysis of technical movements, on the basis of which AI commentary and personalized course generation are carried out. The big model of Shanghai Sports has been applied in physical training, soccer, badminton, tennis and other scenarios, and plays an important role in serving the daily training of several national teams and Olympic preparation.

(2) At the 2024 Paris Olympics, AI technology is widely used in live broadcasting, assisted training, venue management, and public opinion monitoring. For example, Aliyun AI-driven computing provides technology that brings an immersive viewing experience to viewers, including HD cloud live broadcasting, VR/AR panoramic live broadcasting, etc. The AI-assisted training system accurately evaluates athletes' training status and effects, providing the coaching team with a scientific basis for improving the quality of training. These applications not only enhance the viewing experience, but also ensure the safety of the event and the health of the athletes.

(3) In cooperation with China National Basketball Team, based on the “Rising SenseNova 5.5” big model technology of Shangtang, we jointly created an AI big model basketball product. The product is capable of real-time analysis of the movement status of all players on the court and the movement trajectory of the basketball, providing detailed data support for the coaching team, assisting in optimizing the training strategy, and improving the athletes' competitive level. In addition, the Quotient AI Big Model Basketball product has been successfully applied to the daily training of China's three-player basketball national team, providing scientific feedback and basis for the training of athletes, and helping to enhance the competitiveness of China's basketball in the international arena.

2.Models and Strategies of Successful Cases

From the above cases, the following successful models and strategies can be summarized to provide reference for other sports industries.

(1) Cross-discipline cooperation Shanghai Sports University's “Shanghai Sports Big Model” project has cooperated with Baidu, utilizing Baidu's AI technology and platform resources to jointly develop big model applications in the sports field. This cross-field cooperation model can integrate professional resources and technical support from different fields to accelerate the development and application of AI big model technology.

(2) Targeted Technology R&D In the cooperation between Business Intelligence and the China National Basketball Team, a specialized AI big model basketball product was developed for the characteristics and training needs of basketball. This targeted technology research and development strategy can ensure that AI big model technology better meets the actual needs of the sports industry and improve its application effect.

(3) Continuous technological innovation and iteration Successful AI big model applications require continuous technological innovation and product iteration to adapt to the evolving

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needs of the sports industry. For example, Shanghai University of Physical Education plans to continuously update and iterate the Shanghai Sports Big Model to meet the needs of talent training and scientific research.

(4) Multi-scene application The application of AI big model technology in the sports industry is not only limited to training and competitions, but can also be extended to multiple scenarios such as live broadcasting of events, spectator experience, and health management. This multi-scene application strategy can give full play to the potential of AI big model technology and create more value for the sports industry.

Through the analysis of these successful cases, we can see the prospect of the wide application of AI big model technology in the sports industry, as well as the importance of successful models and strategies such as cross-domain cooperation, targeted research and development, continuous innovation and multi-scene application. These experiences and strategies can provide valuable reference and inspiration for other sports industries.

7. CHALLENGES AND COUNTERMEASURES

1.Technical Challenges

The application of generative AI big model technology in the sports industry has brought significant benefits, but it is also accompanied by a series of technical challenges. Among them, data privacy and security is one of the main issues. The sports industry needs to deal with a large amount of personal and sensitive data, such as athletes' physiological data, health records, etc., when applying AI big models, and the leakage or inappropriate use of these data may lead to serious consequences. In addition, how to improve the accuracy and reliability of the model is also a key challenge.AI Big Models need high-quality data to be trained, and in the sports field, data collection may be limited by a variety of factors, such as equipment, environment, etc., which affects the accuracy of the model. Also the generalization ability of the model is a challenge, i.e., the model performs well in one sport but may not work well in another.

2.Social and ethical challenges

The application of generative AI grand modeling techniques may raise a number of social and ethical issues. For example, its application may have an impact on employment, and the application of automation and intelligence may reduce the need for traditional coaches and analysts. Also the issue of fairness should not be ignored; the application of AI big model technology may exacerbate the unequal distribution of sports resources, and economically developed regions and teams may have easier access to advanced technology and thus have an advantage in competition. In addition, AI technology may be used for improper purposes, such as manipulating the results of matches, which will seriously undermine the fairness and integrity of sports.

3.Suggestions for countermeasures

To address the above challenges and ensure the healthy development of AI big modeling technology, the following are some strategies and recommendations:

Strengthen data management and privacy protection Sports organizations and related enterprises should establish strict data management and privacy protection mechanisms to ensure that all data collected and used comply with laws and regulations and have the explicit consent of the data subjects.

Improve the accuracy and reliability of models Improve the accuracy and reliability of AI grand models by using high-quality data, advanced algorithms and continuous model training. At the same time, regular model evaluation and validation should be conducted to ensure that it maintains good performance in different scenarios.

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Promoting Fair Competition Sports governing bodies should formulate relevant policies and rules to ensure the fair and legal use of generative AI grand models and prevent them from being used to manipulate the results of matches or other improper behaviors. At the same time, resource sharing and technology exchange should be encouraged to reduce the unequal distribution of sports resources.

Emphasis on Talent Cultivation and Employment Transformation In the face of the possible employment impacts of AI Big Model technology, sports organizations and educational institutions should pay attention to talent cultivation, provide relevant education and training, and help practitioners adapt to the new technology and achieve employment transformation.

Strengthen ethical review and regulation The sports industry should establish an ethical review mechanism to limit the application of AI big model technology on issues involving ethics and other issues to ensure that it is in line with sportsmanship and ethical standards. At the same time, communication with the government, academia and the public should be strengthened to increase transparency and enhance social trust in AI technology.

8. CONCLUSION AND PROSPECT

1.Research Summary

This study has explored the application of generative AI big model technology in the sports industry, revealing the logic, mechanism and path of its empowerment of the sports industry. At the logical level, AI big model technology improves the efficiency and precision of decision-making through data-driven and pattern recognition, optimizes resource allocation, reduces costs, and enhances user experience and engagement. At the mechanism level, AI big model technology provides decision-making support, improves customer satisfaction and loyalty, and promotes innovation and transformation and upgrading of the industry through data-driven decision-making mechanism, intelligent service mechanism, and innovation-driven development mechanism. At the path level, the application of AI big model technology in the sports industry covers the technology path, industry path and policy path, including data collection, model training, application deployment, sports events, fitness and entertainment, education and training and other fields, as well as the government's policy guidance and support.

2.Research Outlook

The future application of generative AI big model technology in the sports industry is promising, but also faces challenges. The following are several future research directions:

(1) interdisciplinary research Future research can further explore the cross-application of AI big model technology with other disciplines, such as sports science, psychology, management, etc., in order to promote comprehensive innovation in the sports industry.

(2) technology optimization and innovation Research on how to optimize AI big model technology to improve its adaptability and accuracy in different sports and scenarios, as well as how to innovate the application mode to meet the changing needs of the sports industry.

(3) social impact assessment Research on the social, economic and cultural impacts of the application of AI Big Model technology in the sports industry, including employment, fairness and ethical issues, to ensure the sustainable development of the technology.

(4) policy and regulation research With the in-depth application of AI big model technology, there is a need to study and formulate corresponding policies and regulations to standardize the application of the technology, protect personal privacy, and ensure fair competition.

(5)international cooperation and exchange Encourage international cooperation and exchange, share the experience and best practices of the application of AI Big Model technology in the sports industry, and promote the common development of the global sports industry.

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In conclusion, generative AI big model technology provides new opportunities for the high-quality development of the sports industry, and future research should focus on technology optimization, social impact, policy development and international cooperation to achieve the digital transformation and sustainable development of the sports industry.

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