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ARTIFICIAL INTELLIGENCE AND DIGITAL IN SPORTS THE ROLE OF TECHNOLOGIES

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Abstract: This article analyzes the role of artificial intelligence and digital technologies in sports activities, their impact on the training of athletes, competition activities, and the effectiveness of sports management. During the study, the theoretical foundations of the digitalization of sports, modern capabilities of artificial intelligence technologies, and the prospects for their application in sports practice were studied. Based on the analysis of scientific literature, comparative analysis, and generalization methods, the functional capabilities of GPS-monitoring systems, video analytics, biometric sensors, and artificial intelligence platforms used in sports were assessed. The results of the study showed that artificial intelligence technologies are of great importance in individualizing athletes' training, optimizing training loads, predicting sports results, and reducing the risk of injury. It was also found that digital technologies serve to increase the effectiveness of sports management, make data-based decisions, and organize sports activities on a scientific basis. At the end of the study, practical recommendations were developed for the widespread introduction of artificial intelligence and digital technologies in the field of sports.

Keywords: artificial intelligence, digital technologies, sports activities, athlete training, video analytics, GPS monitoring, biometric sensors, sports management, digitalization, sports innovations.

ENTRANCE

In recent years, the acceleration of digital transformation processes worldwide has had a significant impact on all sectors, including the sports system. In particular, the introduction of artificial intelligence technologies, big data, cloud computing systems, biometric monitoring tools and digital analytics platforms is expanding the possibilities of training athletes, managing competition activities and predicting sports results. As a result, traditional approaches to organizing sports activities are gradually integrating with modern digital technologies and entering a new stage of development.

World practice shows that artificial intelligence-based systems allow for automatic analysis of athletes' movements, identification of technical and tactical errors, formation of individual training programs, and preliminary assessment of the risk of injuries. Also, with the help of video analytics, sensor technologies, and smart devices, it is possible to monitor the functional state of athletes in real time and optimize training loads. Such capabilities are important not only for improving the effectiveness of sports results, but also for protecting the health of athletes.

Today, the use of artificial intelligence in sports is becoming an urgent issue not only in professional sports, but also in the system of mass sports, physical education and sports education. The possibilities of organizing remote training, monitoring sports activities, assessing individual development indicators and forming databases through digital platforms are expanding. Therefore,

studying the theoretical and practical foundations of the use of digital technologies in sports activities is one of the priority areas of modern scientific research.

The Republic of Uzbekistan is also implementing consistent reforms aimed at digitizing the sports sector, widely introducing information and communication technologies, and developing innovative management mechanisms. The introduction of modern information systems into the activities of sports organizations, the formation of athlete databases, and the development of digital monitoring systems are recognized as important areas of state policy. This further strengthens the need for in-depth study of the capabilities of artificial intelligence and digital technologies in sports and their effective implementation in practice.

The purpose of this article is to analyze the role of artificial intelligence and digital technologies in sports activities, to scientifically substantiate their importance in improving the effectiveness of athletes' training, competition activities and sports management. Although the issue of using artificial intelligence technologies in sports has become a focus of scientific research since the end of the 20th century, its rapid development has been observed in the last decade. Modern studies scientifically confirm the effectiveness of artificial intelligence in analyzing athletes' activities, optimizing training processes, predicting sports results and reducing the risk of injury. In particular, data processing based on machine learning and deep learning algorithms allows for rapid analysis of large amounts of data on athletes' activities.

The scientific literature highlights several main areas of integration of sports and artificial intelligence. The first area is related to the biomechanical analysis of athletes' movements, in which the accuracy of technical movements is assessed using computer vision technologies. The second area is aimed at monitoring the functional state of athletes' bodies, in which data collected through various sensors, GPS trackers, heart rate monitors and smart devices is processed using artificial intelligence systems. The third area is related to the prediction of sports results and the creation of decision-making support systems.

A number of foreign researchers, studying the impact of artificial intelligence technologies on the training of athletes, have noted that digital monitoring systems allow for the individualization of training loads. In their opinion, it is possible to develop optimal training programs through a comprehensive analysis of data on the physical, technical and psychological state of an athlete. Such an approach will ensure a sustainable increase in sports results, as well as prevent overload and injuries.

The scientific and practical significance of artificial intelligence in sports is also reflected in the sports management system. The use of digital databases, electronic management systems and analytical platforms in the activities of modern sports organizations allows to increase management efficiency. The formation of large volumes of data on the activities of athletes, competition results and training processes is an important source of information for making scientifically based decisions in sports management. At the same time, the widespread introduction of artificial intelligence technologies into sports practice also creates some problems. In particular, the issues of data security, protection of personal information, impartiality of algorithms and training of specialists in the use of technologies require special attention. Studying these problems on a scientific basis and developing effective solutions to them is an important component of the process of digitizing sports.

Based on the above, the study of the potential of artificial intelligence and digital technologies in sports, their impact on athlete training and the effectiveness of sports management, and the scientific and methodological foundations for the implementation of these technologies in practice are emerging as one of the most pressing scientific problems.

Literature review: The issue of using artificial intelligence and digital technologies in sports activities is one of the most promising areas of modern sports science. In recent years, many scientific studies have been carried out on this issue, developing theoretical and practical approaches aimed at improving the training of athletes, analyzing competition performance, and increasing the efficiency of sports management.

In foreign studies, the process of digitization of sports has been studied mainly in connection with big data, artificial intelligence, machine learning and computer vision technologies. Researchers emphasize that artificial intelligence algorithms allow for high-precision analysis of athletes' technical and tactical movements. In particular, the use of video analytics technologies in sports such as football, basketball, tennis and track and field has expanded the possibilities of predicting sports results and assessing the individual characteristics of athletes. In scientific research in the field of sports biomechanics, automated movement analysis technologies occupy a special place. With the help of computer vision systems, the accuracy, speed and efficiency of technical elements performed by athletes are being assessed. As a result, the level of scientific validity of decisions made by coaches and specialists is increasing. A number of studies have also substantiated the importance of artificial intelligence in maintaining the health of athletes. In particular, it has created the opportunity to predict the risk of injury by monitoring the activity of the cardiovascular system, muscle load, recovery processes and fatigue indicators. This approach serves to effectively organize the long-term sports activities of athletes.

In the studies conducted by scientists from the CIS countries, special attention is paid to the issues of introducing information and communication technologies into the process of sports training. They have developed scientific and methodological foundations for monitoring the activities of athletes, forming electronic databases and improving digital management systems. These studies have noted a significant increase in management efficiency and the quality of training as a result of the use of digital technologies in the sports sector. The scientific works of scientists from Uzbekistan also widely cover the issues of modernization of sports education, introduction of innovative pedagogical technologies and formation of a digital educational environment. However, the complex possibilities of artificial intelligence technologies in sports activities, their impact on athlete training and sports management have not yet been sufficiently studied. Most of the existing studies are devoted to individual technologies or specific sports, and scientific developments aimed at a comprehensive assessment of the process of integrating artificial intelligence into the sports system are relatively rare.

The analyzed scientific sources show that the use of artificial intelligence and digital technologies in sports is an important factor in increasing the effectiveness of athlete training, improving coaching activities, and improving the quality of sports management. At the same time, there is a need to further study the practical possibilities of these technologies, adapt them to sports activities, and develop scientific and methodological recommendations.

RESEARCH METHODOLOGY

This study was aimed at studying the role of artificial intelligence and digital technologies in sports activities and their impact on the effectiveness of athletes' training. During the research, the theoretical foundations of the digitalization of sports, the modern capabilities of artificial intelligence technologies and the prospects for their application in sports practice were systematically analyzed. The methodological basis of the study was a systematic approach, an activity-oriented approach and the concept of digital transformation. These approaches made it possible to assess sports activities as a single system, conduct a comprehensive analysis of the

impact of artificial intelligence technologies on athletes' training, competition activities and sports management processes.

Theoretical and empirical research methods were used during the study. The methods of analysis of scientific and pedagogical literature, comparative analysis, generalization, systematization and interpretation of scientific sources were used as theoretical research methods. With the help of these methods, existing scientific views on the use of artificial intelligence and digital technologies in sports were studied and their main development trends were identified. The methods of observation, expert assessment and analysis of practical experiences presented in scientific sources were used as empirical research methods. The results of the activities of GPS-monitoring systems, video analytics platforms, biometric sensors and analytical programs based on artificial intelligence used in sports practice were studied. Also, a comparative analysis of published scientific data on the effectiveness of digital technologies used in various sports was carried out. During the research, digital technologies used in sports were evaluated based on the following criteria: accuracy of data collection, speed of analysis, ability to monitor athletes' performance, degree of optimization of training loads, ability to predict sports results, and impact on management efficiency. These criteria served to determine the practical significance of artificial intelligence technologies in the sports system.

The methods of logical analysis, comparison and scientific inference were used to process and summarize the obtained data. Based on the results of the study, the advantages, existing problems and promising development directions of using artificial intelligence and digital technologies in sports activities were identified. This methodological approach allowed for a deeper coverage of the scientific foundations of the process of digitalization of sports and an objective assessment of the role of artificial intelligence technologies in the sports system. The results of the study showed that the use of artificial intelligence and digital technologies in sports activities is an important factor in improving the effectiveness of athletes' training, competition activities and sports management. As a result of the analysis, it was determined that the integration of digital technologies into the sports system is being carried out in several priority areas.

First, the possibilities for individualizing athletes' training are expanding significantly. With the help of modern sensors, GPS trackers and biometric monitoring tools, a large amount of data is being collected on athletes' heart rate, activity, distance covered, energy expenditure and recovery indicators. Artificial intelligence algorithms process this data and allow us to recommend the most optimal training loads for the athlete.

Secondly, the development of video analytics technologies has created the opportunity to analyze the technical and tactical actions of athletes in more depth. Computer vision systems can assess the accuracy, speed and efficiency of athletes' movements and provide real-time recommendations to coaches. This allows for the rapid identification and elimination of errors made during training.

The analysis showed that digital technologies used in sports practice can be classified according to their functional areas as follows.

Technology type	Main task	Expected result
GPS monitoring systems	Motion activity tracking	Optimize downloads
Video analytics	Technical-tactical analysis	Improve movement quality
Biometric sensors	Physiological monitoring	Injury prevention
Artificial intelligence	Data analysis	Improve decision-making

platforms		efficiency
Cloud database	Data storage and management	Improving sports management

The table data shows the interdependence of technologies used in the sports system and their complex impact on the training of athletes. In particular, analytical platforms based on artificial intelligence are combining data from various sources into a single system, allowing coaches and specialists to make quick and informed decisions. As it was found during the study, the use of artificial intelligence technologies also creates the opportunity to assess in advance the risk of possible injuries in the activities of athletes. Algorithms identify signs of overload by comparing the athlete's previous performance and current functional state. As a result, the ability to change training loads in a timely manner and maintain the athlete's health increases. The results of the discussion show that artificial intelligence and digital technologies can be effectively used in all areas of sports - football, wrestling, judo, sambo, athletics, swimming, gymnastics and other sports. Their main advantage is to reduce the influence of the human factor, increase the accuracy of analysis, and create the possibility of scientifically managing sports activities.

At the same time, the research results also showed the need to develop methodological recommendations for the development of digital infrastructure in sports organizations, increasing the digital competence of specialists, and using artificial intelligence technologies. These factors are considered important for the successful implementation of the process of digitalization of sports. Based on the research results, the following conclusions were drawn: Artificial intelligence and digital technologies have become an important component of the modern sports system, playing an important role in improving the effectiveness of athletes' training, competition activities and sports management. GPS monitoring systems, biometric sensors, video analytics tools and artificial intelligence platforms used in sports activities allow real-time monitoring of athletes' condition, individualization of training loads and scientific forecasting of sports results. Processing large volumes of sports data using artificial intelligence algorithms improves the quality of decision-making in coaching activities and serves to improve the technical and tactical preparation of athletes. The use of digital technologies allows athletes to identify the risk of overload and injury in advance, thereby helping to maintain their health and ensure the continuity of sports activities.

The process of digitalization of sports serves to increase transparency, efficiency and effectiveness in the management of sports organizations and forms a modern model of sports management. The results of the study showed that the use of artificial intelligence and digital technologies in sports, in addition to improving sports results, also creates new opportunities for the development of sports education and research activities. In the future, the widespread introduction of artificial intelligence technologies in the field of sports, the development of digital competence of specialists and the creation of national digital platforms suitable for sports activities will remain one of the important scientific and practical tasks.

It is advisable to introduce digital monitoring systems in sports schools and sports federations. It is necessary to organize advanced training courses in artificial intelligence and sports analytics for coaches and sports specialists. It is recommended to widely use video analytics and biometric monitoring technologies in assessing athletes' performance. It is advisable to include special subjects on artificial intelligence and digital technologies in sports in the curricula of physical education and sports departments of higher educational institutions. It is necessary to form a national digital database in the field of sports and develop a system for using it in scientific research. Thus, artificial intelligence and digital technologies are emerging as an important factor in

increasing efficiency in all areas of sports, protecting the health of athletes, and improving sports management.

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