USE OF INFORMATION TECHNOLOGIES IN GYMNASTICS TRAINING

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ABSTRACT

Information technology has revolutionized gymnastics training, transitioning the sport from a traditional discipline into a data-driven science. Technologies like motion capture, wearable sensors, and AI-based judging support systems allow coaches and athletes to analyze posture, joint angles, and tumbling metrics with microscopic precision, drastically reducing injury risk and accelerating skill acquisition.

Introduction

With the rapid development of artificial intelligence (AI) technology, intelligent teaching methods have gradually penetrated into various fields of education, which has greatly promoted the digitalization of education. As an important AI technology, the application of artificial neural network (ANN) in intelligent teaching has attracted wide attention and research. Gymnastics is a comprehensive and technically challenging sport, but traditional teaching methods face problems such as the difficulty of quantifying the teaching process and the lack of personalized guidance. Especially in the face of students of different ages and different technical levels, how to effectively improve the quality of teaching and the training efficiency of students has become an urgent task in gymnastics teaching.

From this perspective, the establishment of an intelligent gymnastics teaching model driven by information technology not only improves the scientificity and accuracy of gymnastics teaching, but also provides new practical cases for the promotion and application of intelligent teaching technologies. Through the application of information technology, intelligent analysis and feedback of gymnastics movement data can be achieved, which can provide students with personalized training recommendations and training programs, thereby helping them master skills faster and improve sports performance.

Main part

This study aims to establish an intelligent gymnastics teaching model based on Information Technology by overcoming the shortcomings of traditional gymnastics training and promoting the application of intelligent teaching methods in gymnastics training. The specific objectives of the study include: (1) Analyze the main elements and influencing factors in gymnastics training and establish a method to extract features from gymnastics movement

data. (2) Design and develop an intelligent teaching model based on ANNs to analyze data and obtain feedback in real time during gymnastics training. By achieving these research objectives, it is hoped that this study will provide strong technical support for the reform of gymnastics teaching and help further popularize and develop artificial intelligence in the field of education.

The intelligent gymnastics training model combines information technology and motion recognition technology, and uses Kinect and camera equipment to collect athletes' position, motion trajectory and bone data. The model includes four main parts: motion data collection, feature extraction, model training and optimization, and real-time identification and feedback. After data collection, the system pre-processes and extracts key features such as joint angle, velocity and acceleration, and uses information technology to learn and select features. Then, the accuracy and generalization ability of the model are improved by training and improving the information technology model with reinforcement learning and HMM technology. Finally, the model can analyze sensor and video input in real time, automatically detect gymnastic movements, provide immediate feedback and quality assessment, and help build personalized training plans to improve the intelligence of gymnastics teaching and training efficiency. The intelligent gymnastics training model not only realizes the automation of movement detection, but also provides quantitative assessment tools for teaching. Through the data-driven training mode, teachers can guide students more effectively, and students can quickly correct their movements based on the feedback and improve learning effects. To enhance athlete-system interaction and participation, this study develops an intelligent feedback mechanism. The system provides real-time movement detection results and provides visual and auditory signals through voice interaction or AR. This multimodal feedback helps athletes better understand their performance. This allows them to adjust and improve their movements in real time. In addition, the system is optimized based on athlete feedback to improve user experience and training efficiency. Gymnastics is a sport based on precision, strength and skill. As competitions become more intense, athletes and coaches are turning to technology to gain an additional advantage. Data-driven insights are revolutionizing the way gymnasts train, perform and recover, expanding the boundaries of what is possible on the competition floor.

Let’s take a look at how technology and data are changing gymnastics performance and what it means for today’s athletes.

Accurately tracking performance

Sophisticated video recording software or simple video analysis allows coaches to analyze each move in detail. From rotation angles to jump heights, landing forces, and takeoffs, this data can help identify subtle flaws in technique and areas for improvement that may not be visible to the naked eye—a great benefit for visual learners!

It’s better to simply ask gymnasts to watch a routine than to simply ask them to repeat it, repeat it, and repeat it again! Sometimes seeing a mistake with their own eyes allows them to analyze the mistake themselves. It also increases the gymnasts’ understanding of the skill as they perform it.

Personalized Training Programs

Data collected from training sessions allows coaches to tailor exercises to each gymnast’s strengths and weaknesses. Tailoring each training program to their own skill progression, from repetitions to sets, allows them to optimize skill growth while minimizing the risk of injury and increasing training efficiency.

Regular Evaluation

While competition day relies entirely on real-time human feedback, practice sessions and trial competitions allow us to review exercises in greater detail. By monitoring demonstrations, we can analyze each skill and analyze the deductions in detail. This process helps athletes and coaches identify areas for improvement and improve performance before it really matters on competition day.

Progress Tracking

Information Technology makes it easy for gymnasts to see their progress over time. From tracking skill acquisition to tracking flexibility, strength, and consistency, digital tools and apps can record every little improvement. The ability to visually compare videos or stats from week to week can help gymnasts stay motivated, set realistic goals, and celebrate upcoming milestones to improve their performance throughout their gymnastics career.

Information Technology is becoming an essential part of gymnastics. From analyzing complex movements to creating training plans and tracking progress, these tools give coaches and gymnasts a deeper understanding of results and development. While nothing can replace hard work and dedication, the use of information technology can help make every turn, routine, and correction more purposeful - leading to smarter training, safer development, and stronger results on the competition floor.

Conclusion

Gymnastics is an art of movement that requires precision, rhythm, coordination and an inner desire for perfection. Modern digital technologies not only do not interfere with this art, but also, when properly integrated, enhance its potential. They make learning more visual, accessible and effective, creating new opportunities for teachers and students.

However, it is important to maintain a balance between technology and humanity, so as not to replace live physical culture with digital surrogates. The future of gymnastics is already here - and it lies in the synthesis of tradition and innovation.

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