

PROSPECTS OF USING ARTIFICIAL INTELLIGENCE AND TECHNOLOGY IN WRESTLING

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Abstract. Wrestling, a sport rooted in tradition and physical prowess, is undergoing a transformation driven by advancements in artificial intelligence (AI) and modern technologies. This paper explores the current and future potential of using AI and digital tools in wrestling training, performance analysis, injury prevention, and coaching strategies. By integrating smart wearable's, biomechanical tracking, machine learning, and virtual simulations, the sport is poised for an era of data-driven development. The article examines practical applications, benefits, challenges, and future trends in implementing these technologies within wrestling.

Keywords: Wrestling, artificial intelligence, sports technology, performance analysis, smart wearable's, biomechanics, coaching innovation, data analytics.

ПЕРСПЕКТИВЫ ИСПОЛЬЗОВАНИЯ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА И ТЕХНОЛОГИЙ В БОРЬБЕ

Аннотация. Борьба, вид спорта, укорененный в традициях и физической доблести, претерпевает трансформацию, вызванную достижениями в области искусственного интеллекта (ИИ) и современных технологий. В этой статье исследуется текущий и будущий потенциал использования ИИ и цифровых инструментов в тренировках по борьбе, анализе производительности, профилактике травм и стратегиях тренерства. Интегрируя умные носимые устройства, биомеханическое отслеживание, машинное обучение и виртуальное моделирование, спорт готов к эпохе развития, основанного на данных. В статье рассматриваются практические приложения, преимущества, проблемы и будущие тенденции внедрения этих технологий в борьбу.

Ключевые слова: борьба, искусственный интеллект, спортивные технологии, анализ производительности, умные носимые устройства, биомеханика, инновации в тренерстве, аналитика данных.

Introduction

Wrestling, one of the oldest and most physically demanding combat sports, has historically relied on traditional methods of training and coaching. However, as technological innovation permeates every aspect of human performance, the integration of artificial intelligence (AI) and advanced technologies into wrestling is becoming increasingly viable and valuable.

The use of AI promises to elevate athletic performance through precise analysis, individualized training plans, real-time feedback, and injury prevention mechanisms.

This article delves into the technological revolution in wrestling, focusing on how AI and digital tools can enhance performance, coaching, recovery, and overall sports science applications.

1. Performance Analysis Using AI

AI algorithms can analyze video footage of matches and training sessions to identify patterns in movement, technique execution, and strategic decisions. Machine learning tools can assess:

- Takedown success rates
- Reaction times
- Fatigue indicators
- Grip strength variation during matches

Example:

Deep learning models can track the position and posture of wrestlers to detect inefficient techniques or predict possible injuries due to improper body mechanics.

2. Smart Wearables and Biomechanics Monitoring

Smart clothing and wearable devices equipped with sensors can monitor key metrics such as:

- Heart rate variability
- Muscle activation (via EMG sensors)
- Movement symmetry
- Joint stress

Impact:

This data allows for personalized load management, reducing the risk of overtraining and improving recovery strategies.

Example:

In elite training centers, wrestlers wear IMU (Inertial Measurement Unit) sensors to capture real-time data during drills, helping coaches provide immediate biomechanical feedback.

3. Injury Prevention and Rehabilitation

AI-based diagnostic tools can detect early signs of muscular imbalances or movement dysfunctions that may lead to injury. Technologies used include:

- Computer vision for movement screening
- Predictive analytics for risk forecasting
- AI-guided rehab plans

Use Case:

Virtual physiotherapy platforms now use AI to generate tailored rehabilitation exercises with form correction via webcam analysis.

4. Virtual Reality (VR) and Simulation-Based Training

Virtual reality allows wrestlers to practice strategic decision-making and reactions without physical impact. Applications include:

- Simulated opponent behaviors and scenarios
- Cognitive training to enhance reaction time and mental agility
- Visualization and match planning

Example:

VR wrestling simulations developed for Olympic teams provide match environments for mental preparation and visualization of tactics.

5. AI in Coaching and Talent Development

AI assists coaches in designing data-driven training sessions, monitoring progress, and comparing performance with benchmarks. It helps with:

- Match prediction and tactical analysis
- Personalized technique refinement
- Talent identification through motion pattern recognition

Example:

AI software used in wrestling academies can suggest opponent-specific strategies by analyzing competitor databases and previous bout histories.

Conclusion

Artificial intelligence and technological advancements are reshaping the landscape of wrestling. From performance tracking and injury prevention to enhanced coaching and training personalization, AI offers unprecedented opportunities to optimize every aspect of the sport.

While challenges such as cost, accessibility, and data privacy must be addressed, the future of AI in wrestling appears promising. Embracing these innovations will not only modernize training methodologies but also empower athletes to reach their full potential through precision, safety, and efficiency.

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