[1]Wang Luo
[2]XiangLin Luo

Virtual Reality Technology in Rural Sports Sustainable Development Reform Research

Journal of Electrical Systems

Abstract: - Rural sports support unity among communities, encourage physical exercise in natural environments, and preserve regional traditions all of which are beneficial to sustainable development. Villages frequently encourage environmental stewardship and conservation initiatives, highlight cultural history, and promote local economies. By providing realistic practice environments and simulated games, we used virtual reality (VR) technology to improve rural sports and lessen the demand for substantial development infrastructure. A potential disadvantage of adopting VR technology for rural sports is the possibility of insufficient facilities and supplies available in remote areas. In this paper, we propose a novel World Cup Search-driven Quadratic Support Vector Machine (WCS-QSVM) method to enhance the performance of VR in rural sports. We use one of the Chisnese traditional games dragons boating. We employ an immersive setup that replicates the kinematic and sensory subtleties of dragon boating through the use of virtual reality. To allow users to participate in real-world paddling activities, such as moving iron rods on a boat with a reasonably replicated resistance to water, we use a controller-based approach. As a result, we evaluate the performance of our proposal. According to the findings, the use of VR can enhance the growth of sustainable development in rural sports.

Keywords: Virtual reality (VR), rural sports, traditional game, World Cup search-driven quadratic support vector machine (WCS-QSVM)

I. Introduction

Virtual reality (VR)technology has appeared as a revolutionary element in various fields, including sports. Its ability to transform rural sports development is remarkable, providing new ways to engage communities, enhance training, and encourage sustainability [1]. Rural areas frequently face challenges such as limited access to facilities and professional training. VR technology can bridge these gaps by providing enveloping, attainable, and cost-effective solutions to improve sports participation and performance.

One of the primary advantages of VR in rural sports activities is its ability to decorate the availability of training assets [2]. Athletes in remote areas can get admission to notable coaching and training applications through VR, which recreates actual international scenarios and offers interactive remarks. The generation accepts the simulation of numerous sports environments, permitting athletes to practice situations similar to competitive occasions, regardless of their physical place. Consequently, VR can standardize access to sports activities, education, and improvement [3].

VR's massive nature can extensively enhance engagement and motivation for various rural athletes. Traditional training strategies can also be unexciting or inaccessible, mainly to reduce contributors [4]. However, VR could make training more enticing by gamifying the experience and imparting immediate visible remarks on performance. It can encourage regular exercise and help athletes live promptly. Additionally, VR can introduce athletes to sports they won't have kept in mind due to the lack of nearby facilities, broadening their horizons and fostering an extra-diverse sports activities subculture [5].

VR era is integrated into the development of rural sports activities with the goal of sustainable development. It reduces the requirement for physical infrastructure, which may be high priced and environmentally taxing to

[1] Physical Education College，Hunan Normal University，Changsha 410000，Hunan, China

[2]Physical Education College，ShaoYang University，Shaoyang 422000，Hunan, China

[a]Email: syxylw1987@126.com

[b]Email: lxlin98@126.com

[*]Corresponding author

construct and maintain in rural areas. VR structures requiretons less physical space and can be updated digitally, minimizing fabric waste and resource consumption [6]. Furthermore, through simulating community understanding and lowering the demand for journey, VR contributes to decreasing carbon footprints associated with transportation for training and competitions.

Rural areas regularly struggle with insufficient sports activities infrastructure and confined resources. VR can lower those demanding situations via imparting a transportable and adaptable answer. Schools and network centers can install VR systems with quite a low investment in comparison to conventional sports facilities [7]. Moreover, VR can facilitate the appearance of virtual tournaments and leagues, allowing rural athletes to compete and show off their abilities without the call for massive tour. It can result in the discovery and nurturing of skills that would, in any other case, not be noted.

VR provides a transformative capacity for rural sports activities development, addressing challenges of accessibility, engagement, and sustainability [8]. By leveraging this generation, rural communities can foster extra inclusive and dynamic sports surroundings, in the long run contributing to the broader desires of sustainable development and social equity.

The purpose of the paper is to use VR technology to improve rural sports and propose a world cup search-driven quadratic support vector machine (WCS-QSVM) to enhance the performance of VR.

The remaining parts of this paper are,part 2 provides the related work, part 3 presents the methodology, part 4 represents the result as well as discussion and part 5 discusses the conclusion of the paper.

II. Related Works

Virtual reality (VR) technology can be used to greatly increase training effectiveness and prevent injuries in sports, as presented in study [9]. It replicated sports training to prevent damages caused by ineffective training by building a digital human model with virtual reality (VR) technologies. To improve the quality of data extraction, computer approaches were integrated into an intermediate likelihood-based probabilistic framework to record and recreate sports training mobility data.

Study [10] focused on investigating how virtual reality (VR) technology can be used in football practice and how sports training can be combined with VR technology. Exploring virtual systems that were not impacted by outside environmental factors was the goal, as it was expanding the theoretical foundation for the creation and investigation of simulated football sports system software. It helped students grasp technical movement fundamentals and develop their football talents, which in turn led to better instruction and coaching methods.

Study [11] created adaptable virtual reality game software that may be utilized to create racket sports-specific workout routines. Players can easily modify the goals and levels of severity of the workout exercises by establishing cost terms that were associated with the gaming and game's mechanics, and by giving the player control over the cost concepts' characteristics. The findings suggest that a virtual reality game, like the augmented reality table tennis workout game under investigation, can be utilized successfully as a training and exercise assistance.

Virtual reality technology for environmental training games was created in the study [12]. Sensors and other systems for infrastructure gathered experimental data. In an effort to satisfy the requirements of footballers and improve the efficacy of their strategic performance and match outcomes, the experiment aimed to conduct a thorough investigation into the application of AI and VR technological advances to football individuals' strategic applications. When compared to the already recommended approaches in the literature on the subject, the outcomes of our suggested technique were remarkable.

Virtual reality tennis for developing perceptual-cognitive skills, and testing its usability and impartiality was established in study [13]. The movement patterns of participants during tennis matches in virtual reality and the actual world were compared. The Tennis VR adequately captures the essence of tennis in real life. Despite not many adverse effects observed, participants' sense of being present in VR was high, as evidenced by high levels of participation, geographical presence, and ecological reliability and Tennis VR adequately captured the essence of tennis in real life.

Study [14] investigated how martial arts instruction might use virtual reality technology. It used a combination and controlled trials to gather data in response. A large proportion of players viewed virtual reality technology-assisted combative art instruction favorably, based on the results of the experiment, and both types of instruction greatly increased their enthusiasm to explore aggressive arts and produce better outcomes than conventional training.

Study [15] described the way young people's utilization of virtual reality sports games affects their health and sports engagement, as well as the possible connection between both of them. Measured by the Sport Engaged Score (SES) and Shorter Forms 36 (SF-36), correspondingly, the desired outcomes were participation in sports and health. According to the experiment, VR sports games have the potential to improve users' participation in sports and their overall health because of their energy and dedication.

A VR-based basketball training system that consists of a tablet computer and a stand-alone VR device was proposed in study [16]. The goal of the approach was to help players become more proficient in comprehending and applying offensive strategies. An actual basketball court served as the model for the multi-camera person tracking apparatus, which was created to follow and examine every participant's running path as they executed their tactical moves. The findings show that mastering intricate strategies can be facilitated by using the suggested system.

III. Methodology

In this section, we provide a comprehensive explanation of VR setup, controller-based approach, immersion in vision, and proposed method.

3.1 VR setup

We combined a true encoder with an adjustment wheel that presents a paddle in virtual reality to measure the user's rotating information. The true angular position of the paddles is precisely determined by this absolute encoder. After that, microcontroller unit (MCU) software suitable with Arduino processes the digital signals to produce voltage signals (high and low levels) that accurately operate a relay system. Our solution mimics real-world paddle resistance by using a DC-geared engine in brake gear and a resistor to simulate. It is controlled by an MCU via a relay network that operates in two modes: open and short system, which corresponds to low and maximum barriers, correspondingly. Figure 1 represents the graphics for the procedures and responses. Handle movement to surface 1 in Figure 1(a) maintains the circuit opens, simulating low resistance similar to that of a paddle over water. The MCU modifies relay management for tactile input in surface 2 in Figure 1(b), imitating resistance to water while pedaling. Particularly, the MCU's capabilities include encoding the rotary information of the wheels via a WiFi-enabled router within a User Data Gram Protocol (UDP) network information packet.

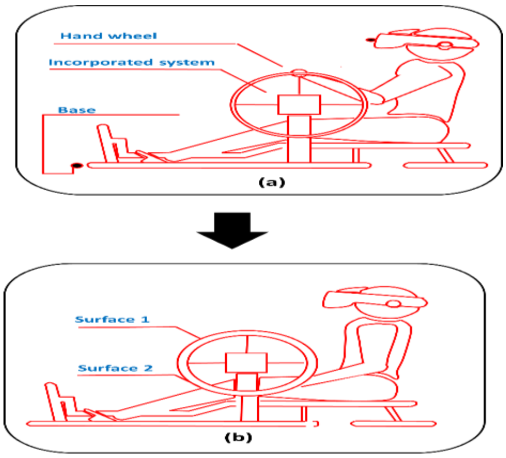

Figure 1: The graphics for the procedures and responses (a) Handle movement (b) relay management

3.2 Controller-based approach

To enable players to participate in sensible paddling activities, together with transferring iron rods on a boat with appropriately replicated water resistance, we use a controller-based approach. This technique involves simulating the bodily resistance encountered when paddling through the water with the aid of dynamically adjusting the pressure remarks at the paddles. The resistance pressure F_r experienced by using the person is modeled as a function of the paddle's velocity V and the medium's resistance coefficient K. The dating may be defined by using the equation:

$$F_r = K.V \tag{1}$$

In which K is a constant that represents the resistance of the water and V is the instant speed of the paddle. A feedback control gadget continuously displays units of the paddle's velocity and adjusts the resistance pressure F_r as a consequence. This ensures that because the person paddles quicker, the resistance they experience will increase proportionally, mimicking the feeling of paddling through the water. The controller set of rules may be implemented with the usage of a proportional-by-product (PD) controller, which helps in offering clean and practical comments by way of considering both the present-day speed and the price of trade of pace. The PD controller's output can be expressed as:

$$F_C = K_P.E(t) + K_D.\frac{DE(t)}{D(t)} \tag{2}$$

F_C is the control force,

$E(t)$ is the error between desire and true velocity,

K_D is the derivative gain K_P is the propagation gain,

The device can ensure a realistic and responsive paddling experience as it should simulate actual international water resistance.

3.3 Create with immersion in vision

The goal of VR is to increase authenticity and engagement. Because of this, the multi-modal information VR experience provides sensory experiences (such as visual, auditory, and tactile input) and generates accurate impressions of a boat race.

3.3.1 Movements of the Body: Players using paddle mechanics in virtual reality can simulate boating authentically by manipulating a physical iron stick. Considering the heaviness and movement typical of boating, this kind of equipment offers tactile sensations that nearly resemble actual paddling. Users can also sit in a real-world mock-up of a dragon boat, which allows for realistic body motions like bending forward and backward.

3.3.2 Virtual replicas: Players of Dragon Boat VR can explore incredibly realistic replicas of well-known places. As they paddle around the virtual surroundings, individuals will have a compelling impression of interacting with their real-world counterparts because of the careful design.

3.3.3 Challenge: With the use of tactile input, the VR dragon boat provides a sophisticated experience of navigating through a variety of obstacles. A direct current (DC) motor continually adjusts for path, velocity, and rotations to imitate paddle pressure.

3.4 Proposed method

We proposed a hybrid of the World Cup search optimization algorithm with a quadratic support vector machine, which is named the World Cup search-driven quadratic support vector machine (WCS-QSVM).

3.4.1 WorldCup Search

WCS promotes sustainability through lowering infrastructure demands and fostering network engagement in rural sports activities. The WCS algorithms arrange teams according to their ranks, allocating the more powerful teams to the initial seed, the weaker teams to the following seed, and so on. During the first period, teams with more strength manage to outlast and advance to a higher level through mutual competition. The difficulty begins with the seeding step. Usually, a preparatory task is given to teams in small groups all over the world to begin the competition. After the first games, the two best teams in each group move on to the next round, with the bottom teams being relegated. The WCS technique can be summarized as the following:

Step 1: Initialization, choosing the teams and regions

It should be noted that in aM variables dimensionality (M_{var})optimization issue with various regions, every continent is going to have an array of $1 \times M_{var}$ indicating the teams that are currently competing in the competitions. The resulting array can be shown as follows:

$$Continent = [Country_1, Country_2, .., Country_{M_{var}}] \tag{3}$$

$$Country_j = [w_1, w_2, \dots, w_{w_1}] \tag{4}$$

Herew_j represents the nation's j^{th} squad. The contents of the constant $(w_1, w_2, \dots, w_{M_{var}})$ appear to be floating point numbers. One way to determine the position of the continental is to value the rank functional e_q at the continent level of$(w_1, w_2, \dots, w_{M_{var}})$:

$$Rank = e_q(continent) = e_q(w_1, w_2, \dots, w_{P_{var}}) \tag{5}$$

$$P = M \times N \tag{6}$$

Where M is the total amount of continents and N is the dimensions of the parameters. An interval is chosen, given values that are arbitrary, and divided into sections that make up each continent to speed up the convergence process. This feature allows the method to converge more quickly than the other algorithms.

Step 2: Assessment of the cost factor

This stage involves calculating the points on the continent. The points attained might not be entirely evident because there might be a continent where some teams have the highest point total while others might have weak points. As a result, this method additionally takes into account the continent's average values and standard deviation:

$$\overline{W} = \frac{1}{m}\sum_{j=1}^{m} W_j \tag{7}$$

$$\sigma = \sqrt{\frac{1}{1-m}\sum_{j=1}^{m}\left(W_j - \overline{W}\right)^2} \tag{8}$$

Where s represents the region $\overline{W}$ variance, $m$characterizes its members, and W displays the continent$W$'s average value.

Step 3: Rating

Organizations receive a ranking using a particular equation in this step:

$$W_1 = [W_{11}, \dots., W_{1m}]^S$$

$$W_2 = [W_{21}, \dots., W_{2m}]^S \tag{9}$$

$$W_5 = [W_{51}, \dots., W_{5m}]^S$$

$$W_{Total} = [W_{11}, \dots. W_{1m}, W_{21}, \dots.. W_{2m}, \dots W_{51}, \dots. W_{5m}]^S \tag{10}$$

Step 4: Repeat the group contest phase

Following the first team tournament, additional continents and the groups that compete in them will be created again using the results of previous championship games and the team rankings. Two-part vectors can be used in this situation as follows:

$$Pop = W_{Total} = [W_{Best}, W_{Rand}] \quad (11)$$

Step 5: Both the exploration and the extraction

The procedure of examining regions of a search space next to places that have been explored previously is known asW_{Best}, while the process of thoroughly inspecting newly discovered sections within a search area is known as W_{Rand}. Cross Point (CP) divides the sizes of W_{Best} and W_{Rand} as follows:

$$W_{Best} = Pop(DO + 1: M, N) \quad (12)$$

End the method if the requirement is satisfied, if not, repeat the program.

3.4.2 Quadratic support vector machine

It complements overall performance through successfully classifying data points and optimizing predictive accuracy in immersive settings. QSVM aids in replicating real-international dynamics like paddling resistance in VR, thereby improving practice simulations and promoting sustainable improvement in rural sports activities. In order to address the classification issues, SVM was developed. Structural risk reduction and the theory of statistical learning provide the foundation of the SVM approach. By projecting input values onto a high-dimensional region, the SVM seeks to determine the line of separation between the two classes. The data set needs to be divided into linear segments in order for Linear SVM to be the largest possible class. Finding the optimal separating hyper-plane (OSH) among the proximal hyper-planes, where the separation to the proximal point is maximal, is the first goal of the SVM.

A set of training variables $w_j \in Q^c$with values from $(w_j, z_j)1 \leq j \leq M, w_j$ values for input, and, c indicates the size of the values that were entered, should be used. The output values are given by the z_j values. Making sure that every point with the same set is on the identical side of the hyperplane and creating hyperplanes are the goals of SVM.

$$z_j(x \times w_j + a) > 0, j = 1, \ldots, M \quad (13)$$

A hyper-plane (1) indicates that a linear separation of the data set is possible. In this instance, Equation (14) is derived by continuously resizing w and b.

$$min_{1 \leq j \leq M} z_j(x \times w_j + a) \geq 0, j = 1, \ldots, M \quad (14)$$

Stated otherwise, $1/|x|$ is the distance that exists between the nearest point and the hyperplane. As a result, the Equation (13) becomes the Equation (15).

$$z_j(x \times w_j + a) > 1 \quad (15)$$

The optimization issue optimizes $\propto_j$ and has a restriction $\sum_{j=1}^{M} z_j \propto_j = 0$ if we choose$(\propto) = (\propto_1, \ldots, \propto_M), M$, without any adverse Lagrangian multiplier, Equation (14). To make sure of this, conventional linear programming needs to be applied.

$$x(\propto) = \sum_{j=1}^{M} \propto_j - \frac{1}{2} \sum_{i=1}^{M} \propto_j \propto_i z_j z_i w_j \times w_i \quad (16)$$

The$OSH(x_0 a_0)$ corresponds to Equation (17) when the vector's $\propto^0 = (\propto_1^0, \ldots, \propto_M^0)$ resolution of the maximizing issue is found in Equation (16).

$$x_0 = \sum_{j=1}^{M} \propto_j^0 z_j w_j \quad (17)$$

The reference point that supplies Equation (17) is the support vectors. Where$\propto_j^0 z_j w_j$, the coordinates are supporting vectors. Equation (18) illustrates the hyper-plane choice function by considering the expansion factor ofa_0.

$$e(w) = sgn\left(\sum_{j=1}^{M} \propto_j^0 z_j w_j \times w + a_0\right) \quad (18)$$

3.4.3 WCS-QSVM

The integration of current artificial intelligence techniques with event-stimulated optimization is achieved through the hybrid of World Cup Search (WCS) with quadratic support vector machine (QSVM) for VR in rural sports for long-time period growth. This method improves VR packages which include immersive athletic education and rural cultural protection by way of optimizing QSVM parameters with WCS. With the help of QSVM's classification abilities and the tournament dynamics of WCS, the hybrid version seeks to increase the precision and efficacy of VR solutions that assist network involvement and sustainable rural sports.

IV. Result and discussion

We used 30 participants to evaluate the performance of movements before and after using VR, assessing both the best and average performance. We considered four movements, including paddling, steering, balancing, and team coordination. Table 1 and Figure 1 represent the performance before using VR. Paddling (best-15, average-25), steering (best-11, average-20), balancing (best-18, average-22) and team coordination (best-14, average-19) are depicted in Figure 2. Before using VR, the participants performed the movements at an average level compared to the best level.

Table 1: Performance of movements before using VR

Movements	Best	Average
Paddling	15	25
Steering	11	20
Balancing	18	22
Team coordination	14	19

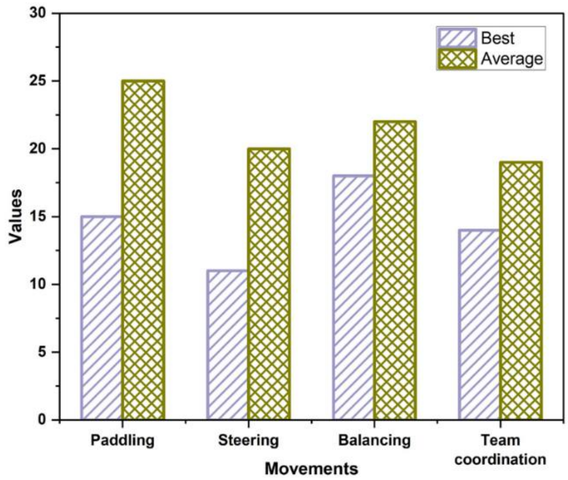

Figure 2: Performance of movements before using VR

Table 2 and Figure 3 display the performance after using VR. In Figure 3, paddling (best-25, average-18), steering (best-22, average-13), balancing (best-27, average-16) and team coordination (best-28, average-12) are displayed. According to the findings, after using VR, the participants showed their best performance in performing movements.

Table 2: Performance of movements after using VR

Movements	Best	Average
Paddling	25	18
Steering	22	13
Balancing	27	16
Team coordination	28	12

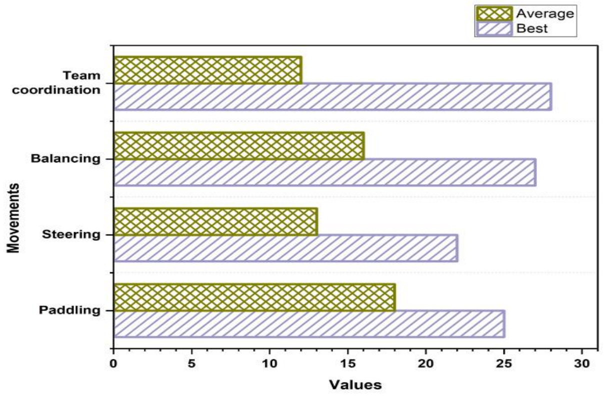

Figure 3: Performance of movements after using VR

Table 3 and Figure 4 represent the participant’s interests. In Figure 4, we evaluate the participant's interest in VR dragon boating based on the matrices, including very curious (50%), interested (25%), doubtful (11%), uninterested (9%), and bored (5%). Regarding the findings, the participants are more interested in using VR for dragon boating.

Table 3: The participant’s interest

Participant’s interest	Percentage (%)
Very curious	50
Interested	25
Doubtful	11
Uninterested	9
Bored	5

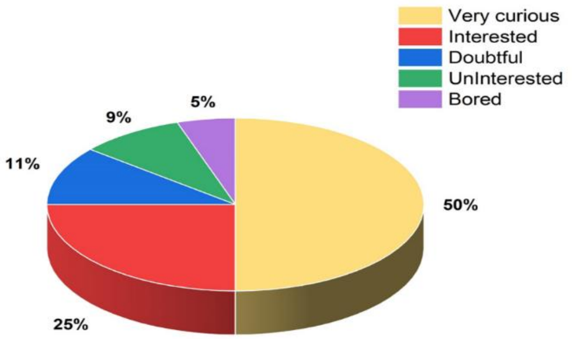

Figure 4: The participant’s interest

During dragon boating, injuries definitely occur. We identified four main injuries including shoulder strain, lower back pain, wrist tendonitis, along with hand and arm fatigue, and evaluated these four in both VR and physical dragon boating. Table 4 and Figure 5 represent the injuries level in both physical and VR. Physical dragon boating attained shoulder strains (45%), lower back pain (40%), wrist tendonitis (45%), and hand as well as arm fatigue (55%). VR dragon boating attained lower back pain (5%), hand and arm fatigue (13%), shoulder strains (10%), and wrist tendonitis (8%). Regarding the findings, VR has a low level of injuries compared to physical.

Table 4: Injuries level in both physical and VR

Injuries	Physical (%)	VR (%)
Shoulder strains	45	10
Lower back pain	40	5
Wrist tendonitis	45	8
Hand & arm fatigue	55	13

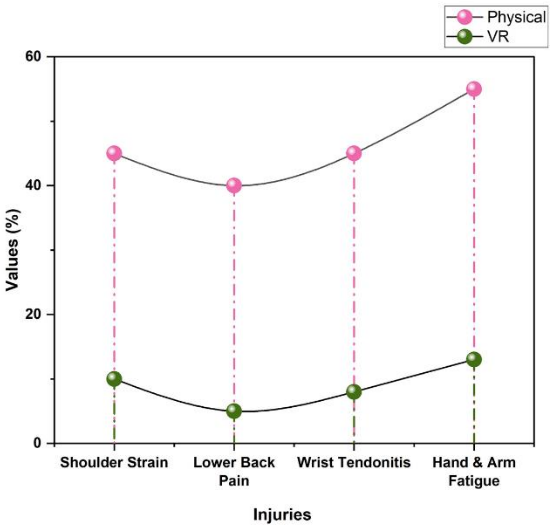

Figure 5: Injuries level in both physical and VR

We evaluate the participant's personal fulfillment, such as self-confidence and satisfaction in both physical and VR. Table 5 and Figure 6 represent the level of self-confidence and satisfaction, in both physical and VR. Self-confidence scored in physical (80%) and VR (83%), and satisfaction scored in physical (82%) and VR (86%). When compared to the physical and VR, VR has superior performance in both self-confidence and satisfaction.

Table 5: The level of self-confidence and satisfaction in both physical and VR

Personal fulfillment	Physical (%)	VR (%)
Self-confident	80	83
Satisfaction	82	86

Figure 6: The level of self-confidence and satisfaction in both physical and VR

V. Conclusion

Rural sports promote cohesiveness among communities, stimulate physical activity in outdoor settings, and uphold local customs, all of which are advantageous for sustainable development. We found that using virtual reality (VR) technology to create realistic practice spaces and simulated games can enhance rural sports and reduce the need for significant development infrastructure. In this paper, we propose a novel World Cup search-driven quadratic support vector machine (WCS-QSVM) method to enhance the performance of VR in rural sports. We conduct a traditional Chinese game called dragon boating. We adopt a controller-based approach to create an immersive virtual reality setup that mimics the kinematics and perceptual intricacies of dragon boating. As a result, we used 30 participants to evaluate the performance of VR based on the matrices such as movements before using VR and after using VR, participants' interest, injuries, self-confidence, and satisfaction. According to the findings, VR has superior performance in rural sports to sustainable development. The excessive initial costs of installing and maintaining virtual reality (VR) equipment in remote locations are a substantial barrier that could put pressure on already tight community budgets. Furthermore, remote areas don't have the essential technological guide for dependable VR operation, which could save the individual a good-sized usage and accessibility. Further investigations into the WCS-QSVM method and immersive VR environments to encompass other traditional rural sports might make stronger cultural conservation projects and foster community engagement. By combining present-day AI algorithms with haptic feedback technology, education reports ought to be optimized by enhancing realism and personal engagement in virtual environments.

Reference

[1] Yildirim, C.(2024). Transformative Virtual Reality Games for Adaptive Sports Training: Exploring the Perceptions of Individuals with Mobility Impairments. International Journal of Human–Computer Interaction, pp.1-13.
[2] Wilkins, L.(2024). A Framework for Using Virtual Reality to Enhance Psychological Performance in Baseball. Journal of Sport Psychology in Action, pp.1-16.
[3] NAGORNA, V., MYTKO, A., BORYSOVA, O., POTOP, V., PETRENKO, H., ZHYHAILOVA, L., FOLVAROCHNYI, I. and LORENZETTI, S.(2024). Innovative technologies in sports games: A comprehensive investigation of theory and practice. Journal of Physical Education and Sport, pp.585-596.
[4] Zhang, F.(2024) Inheritance and Innovative Presentation of Sports Intangible Cultural Heritage Based on VR Technology. Applied Mathematics and Nonlinear Sciences, 9(1).
[5] Cossich, V.R., Carlgren, D., Holash, R.J. and Katz, L.(2023). Technological Breakthroughs in Sport: Current Practice and Future Potential of Artificial Intelligence, Virtual Reality, Augmented Reality, and Modern Data Visualization in Performance Analysis. Applied Sciences, 13(23), p.12965.
[6] Pickman, D.(2023). The Use of Virtual Reality and Augmented Reality in Enhancing the Sports Viewing Experience. International Journal of Arts, Recreation and Sports, 1(2), pp.39-49.
[7] Bedir, D. and Erhan, S.E.(2021). The effect of virtual reality technology on the imagery skills and performance of target-based sports athletes. Frontiers in Psychology, 11, p.551149.

[8] Zhou, L., Ke, Z. and Waqas, M.(2023). Beyond the Arena: How sports economics is advancing China's sustainable development goals. Heliyon, 9(7).
[9] Liu, B. and Tian, D.(2024) Application of VR technology in sports training in colleges and universities. Applied Mathematics and Nonlinear Sciences, 9(1).
[10] Zhao, K. and Guo, X.(2022). Analysis of the application of virtual reality technology in football training. Journal of Sensors, (1), p.1339434.
[11] Liu, H., Wang, Z., Mousas, C. and Kao, D. (2020). Virtual reality racket sports: Virtual drills for exercise and training. In 2020 IEEE International Symposium on Mixed and Augmented Reality (ISMAR) (pp. 566-576). IEEE.
[12] Shao, Q.(2024). Virtual reality and ANN-based three-dimensional tactical training model for football players. Soft Computing, 28(4), pp.3633-3648.
[13] Le Noury, P., Buszard, T., Reid, M. and Farrow, D.(2021). Examining the representativeness of a virtual reality environment for simulation of tennis performance. Journal of Sports Sciences, 39(4), pp.412-420.
[14] Pu, Y. and Yang, Y.(2022). Application of virtual reality technology in martial arts situational teaching. Mobile Information Systems, 2022(1), p.6497310.
[15] Hanifah, H., Ito, Y., Yao, D.P.G., Suyama, N. and Inoue, K.(2022). Promoting Sports Engagement during the COVID-19 Pandemic via Virtual Reality Games. Occupational therapy international, 2022(1), p.4824152.
[16] Tsai, W.L., Pan, T.Y. and Hu, M.C.(2020). Feasibility study on virtual reality based basketball tactic training. IEEE Transactions on Visualization and Computer Graphics, 28(8), pp.2970-2982.