

## Retraction

# Retracted: Application of Virtual Reality Based on Computer Vision in Sports Posture Correction

### Wireless Communications and Mobile Computing

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

In addition, our investigation has also shown that one or more of the following human-subject reporting requirements has not been met in this article: ethical approval by an Institutional Review Board (IRB) committee or equivalent, patient/participant consent to participate, and/or agreement to publish patient/participant details (where relevant).

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

### References

- [1] C. Zhu, R. Shao, X. Zhang, S. Gao, and B. Li, "Application of Virtual Reality Based on Computer Vision in Sports Posture Correction," *Wireless Communications and Mobile Computing*, vol. 2022, Article ID 3719971, 15 pages, 2022.

## Research Article

# Application of Virtual Reality Based on Computer Vision in Sports Posture Correction

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In recent years, with the rise of virtual and sports, people are often injured due to irregular movements during exercise. Based on this, this article takes the basic concept of computer virtual reality as the starting point and analyzes the adoption of computer virtual reality in sports correction. The choice of corrective exercises depends on the daily wrong exercises. If there is an error in any operation, please select the corresponding operation mode for the error operation for corrective training. If there are multiple errors at the same time, we compare and select the error operation that needs to be resolved first and the error operation that needs to be resolved later. In our daily life, the squat action pattern of Tai Chi Half-squat stance ball is closely related to us, and its action pattern can fully reflect the core stability of the subject. In this study, 42 students were selected as the students of a college sports college in Dalian. There are 7 people in each group, divided into 6 groups. The first three groups used exercise correction to assist the traditional teaching method (experimental group). It was found that the performance error rate of the first three groups reached 65%, and the last three groups used the assisted virtual reality teaching method, and the error rate was only 4%. Therefore, we adopted the teaching of virtual reality can reduce the error rate of the movement posture. We trained them for half a year and assessed and scored them once a month. We collect this data and analyze it to reach a conclusion. The experimental results prove that the experimental group has a significant difference before and after the squat test ( $P < 0.05$ ), and postexperiment there is a remarkable disparity among the experimental group and the comparison group ( $P < 0.05$ ). Therefore, squatting correction training is effective in improving the wrong squat. It is very effective for problems such as posture movement mode and joint limitation. Therefore, it is a very meaningful thing to explore the exercise correction training based on the virtual reality of computer vision.

## 1. Introduction

Virtual reality refers to combines docking control equipment and other auxiliary equipment to process and calculate information through computer programs and finally form a display terminal that can interact, simulate natural conditions and three-dimensional environments, and make people feel immersed [1]. Virtual reality has become an inevitable trend in the development of future media, and this trend will bring about subversive changes to the media industry. This change is not only limited to the media but also involves all aspects of the communication process. The objective of this paper is to investigate the state of virtual

reality and the implications of “immersion” dissemination for media in the field of journalism in the context of related concepts and case studies. Virtual reception is an up-and-coming “black,” and various companies are looking at the potential revenue from virtual reality and are launching programs and products. The concept of virtual reality, referred to as VR, is a realistic computer environment that integrates vision, audio, and simulation. The combination of virtual reality and sports action correction has also been concretely practiced and has achieved certain success. Due to the many hidden dangers brought about by the “immersive” dissemination of virtual reality, we have to think about and respond to the risks in future practical applications.

Many foreign experts and scholars have conducted effective analysis and research on technical error correction in terms of psychological factors, environmental factors, physical fitness factors, and so on. For the correction of sports movements, there are also discussions on training methods, methods, or certain links. If the coach only gives one-sided prompts instead of starting from the root cause, it can often only make the practitioner see the appearance of the wrong action. In this way, the practitioner is not clear about the root cause of the wrong action and cannot guarantee effective correction of the wrong action. Lopez-Fuentes et al. suggested that in the process of technical movement teaching, teachers who correct students' movement errors in movement should follow the law of students' movement skills and choose reasonable error correction methods to achieve good error correction effects [2]. Sabanci et al. pointed out that tennis is a highly technical sport. From a biomechanical point of view, the perfect technique is to effectively combine strength and control and minimize injuries [3]. Morrison et al. analyzed the influence of environmental factors on skill learning and the control of environmental factors: teaching environment is one of the elements of teaching activities, and it has a great influence on teaching activities [4].

There are a lot of literatures on error correction analysis and correction of sports movements in our country; however, most of them are divided into two types. One is to analyze and correct only a certain part of, but it does not consider the connection with the overall action and cannot grasp the root cause of the error. The second is the listing and description of various wrong actions not only did not analyze and discuss the cause of the error and corrective methods in detail but also did not organize and analyze the wrong actions. Dong et al. proved that the upper limb muscles are more active when hitting the ball with both hands than when hitting the ball with one hand. Any change in the elbow morbidity of players using this method is not related to the decrease in extensor activity, but is incorrectly affected [5]. Naik et al. pointed out that in the teaching of throwing techniques, it is necessary to correct the wrong actions in time, because there is an inevitable connection between the correct throwing actions that mutually restrict each other, and the occurrence and changes of wrong actions are also regular [6]. Fang et al. discussed the "cross-border integration," "deep content," and "immersive participatory" new changes brought to the traditional journalism by VR and combined with case analysis to summarize the limitations and challenges in the application of this. Prospects considering the prospect and development direction of the fusion of reality and news are obtained [7]. Wu discussed correct recognition and correction of swimmers' wrong posture can improve the training quality of athletes on weekdays. The traditional method is to extract these feature points and compare them with the correct posture to realize posture recognition and correction. Aiming at the problem that athletes' wrong posture cannot be detected and corrected in real time, a position recognition and correction method of swimmers based on depth image bone tracking is proposed, and the image is preprocessed by threshold

method. Kalian filter is used to filter the collected image, and surf method is used to filter the edge points and action feature points with low brightness [8]. Pheasant pointed out that subacromial impact is a common condition for high-altitude athletes. The causes of subacromial impingement may be multifactorial, usually involving impaired rotator cuff function. It is caused by incorrect exercise posture. We calibrate the movement posture, which helps with functional subacromial impact. After this discovery, athletes showed rapid recovery of rotator cuff strength and relief of impact symptoms in response to the expansion of cervical spine retraction and retraction range of motion and posture correction. Both of them resumed unrestricted physical activity within a week [9]. Wong and Paton pointed out that background abnormal dynamic knee torque and static foot posture are risk factors for the development of chronic lower limb injury. However, in running gait, the relationship between the two has not been determined. The objective was to study the correlation between static foot posture and maximum knee adduction. Designing a single group prospective exploratory study design was implemented [10]. Han and Song pointed out that the purpose of this study is to divide male and female college students into two groups to measure and analyze the changes of balance, shoulder gradient, and head forward posture after a 12-week joint exercise program: 19 in the joint exercise group and 18 in the control group. The results show that incorrect posture can easily lead to athletes' injury [11].

At present, many researchers put the core of functional training on sports training research, but there are relatively few studies on corrective training. This research conducts an experimental analysis on corrective training of sports movements based on virtual reality, discusses the influence of corrective training on squat errors, and provides theoretical and practical basis for the application of corrective training in other fields. This article puts the focus of research on this brand-new field, closely following the trend of sports development, and has a distinct sense of the times. Through the content analysis method, the development dynamics and trends of virtual reality in the industry were analyzed, and many hidden dangers were discovered, which provided a strong basis for the proposal of solutions.

## 2. Application of Virtual Reality Based on Computer Vision in Sports Action Correction

*2.1. General Process of Computer Vision to Generate Pictures.* Virtual reality technology is a brand new practical technology developed in the 20th century. Virtual reality technology includes computer, electronic information, and simulation technology, and its basic realization method is that the computer simulates the virtual environment to give people a sense of environmental immersion [12]. First, the captured discrete images or continuous videos are used as raw data to create panoramic images through editing [13]. Creating a virtual panoramic image environment involves many related technologies. Image stitching is the most critical and basic in panoramic image generation. The main content

of this article is the application of virtual reality in sports action correction, as shown in Figure 1 [14].

### (1) Image preprocessing

The objective of image preprocessing is to guarantee the correctness of the input of the next image, to do some collapsing variations in the raw image, coordinate shifts, or to preserve and strengthen the picture with faulty graphics [15]. It primarily involves fundamental elementary image modifying facilities, pattern template, image transformations, and exported feature sets, prelocalization, approximate duplication region search, narrowing the scope of mapping and enhancing the velocity [16].

### (2) Transition pattern

In the course of photographing an issue, the situation of the scene is decided by the motion of the pump. Usually, the camera motion can be categorized into panning motion, lens zoom, vertical sweep, and rotary motion [17]. The various approaches of shifting the imager will generate varying impacts in the field. The sophisticated camera motion unavoidably results in diverse image series in space, particularly superimposed image series [18]. Because of the complicated camera movement, a great many coordinate conversions, both stiff-body, associative and projection, are required before the images [19].

### (3) Picture alignment

The accuracy of the sewn picture primarily hinges on the quality of the graphic entry. The primary question is to search for the transition and locate in the sample frame the counterpart position of the pattern or feature points in the image to be sewn. Based on the correspondence between the attributes of the stencil or issue, the respective values of the paragraphs in the statistical matrix can be extracted [20].

### (4) Picture integration

The picture composition policy must optimize the residual distance between pictures and the influence of luminance variations in the composition result. The objectives involve stitching together images by design, brightness tuning and mixing, overlapped areas, and seam removal. While the panorama implementation steps may vary from image splicing arrangement to application, the rough process consists of the foregoing steps [21].

## 2.2. General Process of Computer Vision to Generate Pictures

### (1) Image preprocessing

The primary objective of presetting the image is to guarantee the precision of the next alignment process within the image basic structure and to suppress all kinds of disturbing contents and improve the usable parameters of the image alignment [21] and make the image it can meet the needs

of image registration quality. This usually includes the following pretreatment methods [22]:

### (1) Image denoising and enhancement

Image denoising and image enhancement are mainly to empowering helpful intelligence in the image, suppress spam, and process the image to capture images with better visual effects [23]. The purpose of image denoising and image improvement is to improve image quality. Aiming at the fuzzy state of the original image and its application, it deliberately emphasizes the overall or partial features of the image, improves the definition, and makes the image easier to edit [24].

### (2) Correction of image geometric distortion

Suppose that the coordinate  $(x, y)$  of the original image is the coordinate  $(x', y')$  of the distortion image, so the relationship between the two tables can be described by the following equation:

$$x' = h_1(x, y), \quad (1)$$

$$y' = h_2(x, y). \quad (2)$$

If  $g(x, y)$  is used to indicates grayscale level the original image at point  $(x, y)$ , and  $f(x', y')$  is used to represent the gray level of the distorted image at point  $(x', y')$ , then:

$$g(x, y) = f(x', y'). \quad (3)$$

In this way, the problem of eliminating the geometric distortion to restore the original image comes down to the problem of finding  $g(x, y)$  from the relationship between the distorted image  $f(x', y')$  and the two coordinates  $h_1$  and  $h_2$ .

### (2) Sports correction algorithm

Despite the fact that there is a structured system of disciplinary regulations for any type of exercise, continuous variations are experienced in the disciplinary procedure, together with variations in students' comprehension and reception of information, will provide teachers with important oral explanations [25]. According to the positive correction algorithm,  $(x', y')$  corresponds to  $R(u, v, w)$  in action:

$$\begin{cases} u = t\left(\frac{x-w}{2}\right), \\ u = t\left(\frac{y-w}{2}\right), \\ w = t(-f), \end{cases} \quad (4)$$

$$u^2 + w^2 = f^2. \quad (5)$$

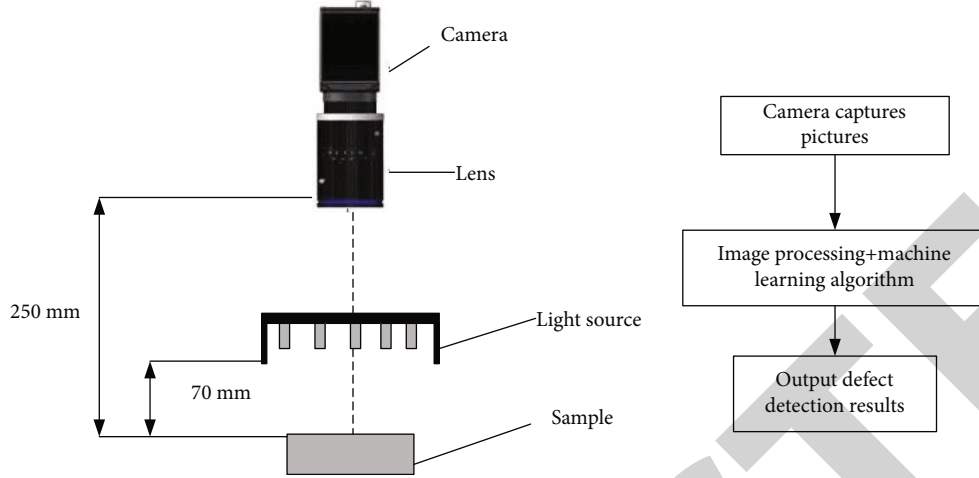


FIGURE 1: The flow of constructing a cylindrical panoramic image.

Combining Formula (4) and Formula (5) can get

$$\begin{cases} t = \frac{f}{\sqrt{(x-w/2)^2 + f^2}}, \\ u = \frac{f(x-w/2)}{\sqrt{(x-w/2)^2 + f^2}}, \\ u = \frac{f(x-H/2)}{\sqrt{(x-w/2)^2 + f^2}}, \\ u = \frac{f^2}{\sqrt{(x-w/2)^2 + f^2}}. \end{cases} \quad (6)$$

Combine all these points of view to get a panoramic view. But the argument parameters coordinates are in 3D and have to be translated into 2D image coordinate for easy and convenient storage [26]. Here, the 3D parameter coordinates are transformed to 2D image coordinates using the following formula [27]:

$$\begin{cases} x' = f \cdot \arctan\left(\frac{u}{m}\right) + f \cdot 0, \\ y' = v + \frac{H}{2}, \end{cases} \quad (7)$$

$$\theta = \frac{hfov}{2} = \arv \tan\left(\frac{w}{2f}\right). \quad (8)$$

Combine Formula (6), Formula (7), and Formula (8) to get

$$\begin{cases} x' = f \cdot \arctan\left(\frac{x-w/2}{f}\right) + f \cdot \arctan\left(\frac{w}{2f}\right), \\ y' = \frac{f(y-H/2)}{\sqrt{(x-w/2)^2 + f^2}} + \frac{H}{2}. \end{cases} \quad (9)$$

It can also be concluded from Formula (9) that the correction algorithm has the property of not causing great deviations in sports actions [28]. This attribute permits us to apply the calibration shadow conversion to each motion picture individually and then get a complete sports action through image splicing [29]. From the positive correction algorithm,  $(x', y')$  corresponds to  $R(u, v, w)$  in action:

$$\begin{cases} u = f \cdot \sin\left(\frac{x' - f \cdot \arctan(w/2f)}{f}\right), \\ v = y' - \frac{H}{2}, \\ w = f \cdot \cos\left(\frac{x' - f \cdot \arctan(w/2f)}{f}\right), \end{cases} \quad (10)$$

$$\begin{bmatrix} u' \\ v' \\ w' \end{bmatrix} = \begin{bmatrix} \cos \theta & 0 & \sin \theta \\ 0 & 1 & 0 \\ \sin \theta & 0 & \cos \theta \end{bmatrix}. \quad (11)$$

Determine whether the details of sports movements are more or less flawed:

$$r = tu', s = tv', q = tw'), \quad (12)$$

$$q = -f', \quad (13)$$

$$\begin{cases} t = -\frac{f}{w}, \\ x = r + \frac{w}{2}, \\ y = s + \frac{H}{2}. \end{cases} \quad (14)$$

Combine the above formulas to get:

$$\begin{cases} x = f \cdot \tan \left( \frac{x' - f \cdot \arctan (w/2f)}{f} - \theta \right) + \frac{w}{2}, \\ y = \frac{f \cdot \arctan (y' - H/2)}{\cos \left( \left( \frac{x' - f \cdot \arctan (w/2f)}{f} - \theta \right) \right)} + \frac{w}{2}. \end{cases} \quad (15)$$

### (3) Improve sports correction algorithm

Teachers with the help of computer virtual reality to convert training situations into instructional videos can visually display student testing to conserve capital expenditure on tools [30], offset the limitations of the real world, and attempt to even distribute educational films to pupils in advent. Without compromising the efficacy of teaching, students are encouraged to learn on their own and cultivate their independent training and learning abilities [31]. They even try to disseminate promotional videos to upcoming students, without interfering with the instructional effectiveness. For teachers, they can make their teaching more effective; on the other hand, they can also make teaching more effective and continuously improve your computer operation skills [32].

$$\partial = \arctg \left( \frac{x}{r} \right). \quad (16)$$

After adjusting sports actions:

$$x' = r \cdot \partial = r \cdot \arctg \left( \frac{x}{r} \right), \quad (17)$$

$$y' = y \cdot r \left( \frac{r}{\cos \partial} \right) = y \cdot \cos \partial. \quad (18)$$

Improve sports correction algorithm:

$$\begin{cases} \partial = \arctg \left( \frac{x}{r} \right), \\ x' = r \cdot \partial, \\ y' = y \cdot \cos \partial. \end{cases} \quad (19)$$

The corrective formula can be deduced:

$$\begin{cases} x = r \cdot \arctg \left( \frac{x'}{r} \right), \\ y = \frac{y'}{\cos \partial}, \\ \partial = \arctg \left( \frac{x'}{r} \right). \end{cases} \quad (20)$$

## 2.3. Corrective Training

### (1) Application of corrective training in sports action correction

During the training process, the physical therapist will provide more guidance on language and movement, and people do not correct their movements in time through their own feelings and comments [33]. This kind of exercise does not activate the sensory and motor systems that use nerves, but only moves a part of the body according to the most basic exercise theory, so it does not work, and it has an impact on improving movement and reducing compensation. For athletes who have recovered from injuries, corrective training can help them solve physical compensation problems and is a useful tool to prevent recurrence of injuries and improve athletic performance [34].

### (2) Corrective training process

Corrective training can eliminate or reduce the wrong way of movement in the functional movement mode. It requires destruction to help destroy the flexibility and stability before constructing the correct movement mode, because only then will the problem appear during the training process, to focus all attention on motor control exercises. In the process of corrective education, simple and effective practical courses must be followed: Subjects must be checked and evaluated before corrective training, because in this process, it is necessary to collect the reasons for students' wrong patterns, such as disadvantages. During the remedial training process, you should observe whether the subject has made progress based on the initial assessment, then record the positive and negative changes, and use this information to modify the remedial training method. When the target action plan changes significantly after the training, the theme should be reviewed and reevaluated to check whether other modes of action have changed to help the coach clarify the key points of the training and move the problem forward.

### (3) Introduction to Taijiquan movements selected for training

The training selects the footstep action in the basic footwork of Tai Chi Half-squat stance the action is shown in Figure 2. The trainer is required to hold his chest, stand waist, open his hip, and touch the ground with his whole soles. At the same time, the two legs are separated left and right, and the distance between the two feet is about four to five times the length of the feet. One leg bends its knees and squats completely, and the knee and toe abduct; the other leg is straight and flat, close to the ground, all feet on the ground. The action essentials require that the thighs on the side of the knee bend close to the lower leg, and the soles of the feet on the side of the knee extend close to the ground without eversion.

### (4) Corrective training sequence problem

From the perspective of the laws of human development, the flexibility of a newborn baby is unlimited, stable control is slow, and overall movement is the last to learn. Therefore, when there is a problem with the total energy, we must find



FIGURE 2: Tai Chi Half-squat stance action example.

the root, find out where the original problem occurred, and then solve it. Correction training must be correct, and the focus of each link is different. The main link of corrective education is flexibility. The purpose is to open the common range of motion to restricted areas, so that students' sports activities are not restricted. The second link is stability, which allows the body to obtain better movement control. The third is the retraining of the mode of action. The focus is on the mode of operation so that the body can make better use of its own flexibility and stability. The selection of remedial training measures should be attributed to abnormal behavior patterns, discover the causes of wrong behavior patterns, and plan corrective training measures to correct them. If it is found that there are many problems with the movement of the subject during the inspection, it is necessary to analyze which is more serious and find the most serious movement, first solve the main problem, and then solve the secondary problem. Buckle your knees inward between your legs. The main reason for this action is the weakness of the gluteus medius and adductor muscles. The improvement is to exercise virtual reality to strengthen the gluteus medius.

### 3. Application of Virtual Reality in Sports Action Correction

**3.1. System Framework Layout.** The application level, service level, and data level should be included in the framework of the system. The primary mission of the virtual reality-based emergency decision-making system is to reason and make and maintain a case base for emergency events. The application

level primarily implements the functions of serving the system, which include case inference, case administration, and assistance services of the system. The building of the service-layer is implemented by the velocity for development utility of Visual Basic 6.0; the data tier comprises the rule base and the case base; the case base is for housing caseload and the regular repository is for realizing selected capabilities of case deduction and managerial. The data layer is built by a SQL 2008 database. The framework of the system is shown in Figure 3.

**3.2. Test Subject.** This article uses a sports action correction system based on virtual reality. This system belongs to non-immersive virtual reality. It is used in computers to build a flat virtual system for trainers to learn. This article uses squats as an assessment item and squats as the research object; the method of corrective exercise training is to establish corrective training exercises on the squat movement mode. When the subjects are found to have weak links, find the reasons for their occurrence and analyze them, and formulate corrective training to improve the weak link of exercisers can improve athletic ability and prevent injuries. 42 academics from the physical education college of X University are selected as the research objects of this experiment. Each group of 7 people is divided into 6 groups. The first 3 groups use sports correction systems to assist traditional teaching methods (experimental group), and the last three groups use traditional methods, action correction method, and no training task (control group). We train them for six months and check and score them once a month, and we collect these data and analyze them to get a conclusion.

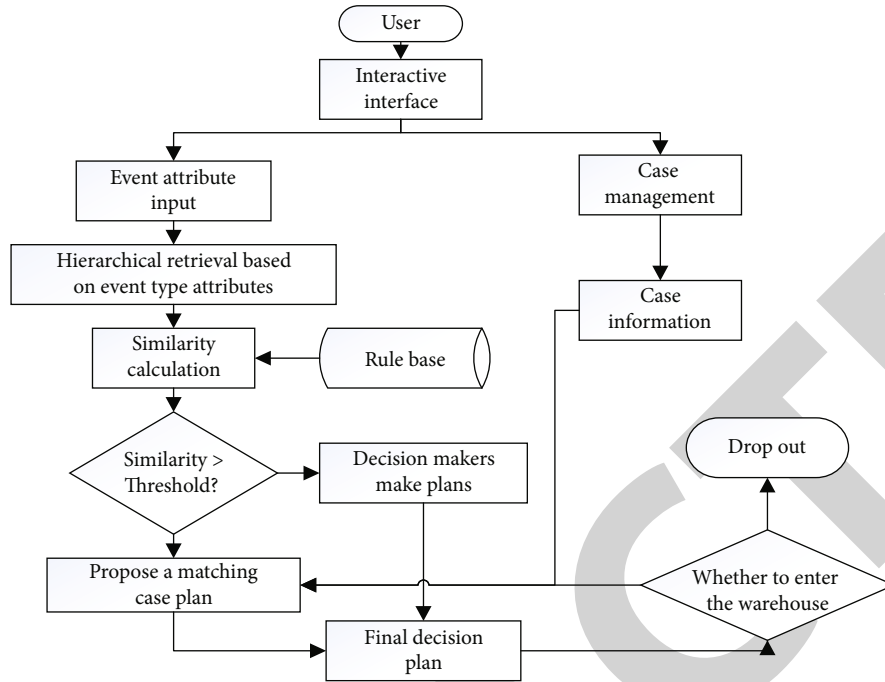


FIGURE 3: Work flow chart of emergency decision-making system for emergencies.

TABLE 1: Summary table of reliability test results.

Category	Index combination	Alpha coefficient ( $\alpha$ )
Lower limb	Straight knee bent over	0.7362
	Knee buckle	
	Insufficient lunges	
Trunk	Not following the action	0.8553
	Easy to bow back	
	Insufficient rotation	
	Insufficient waist twist	
Upper limb	The arm and the body cannot be coordinated	0.7641
	Arm tension	
	Hold too low	
Head	The angle between the arm and the body is too large	0.7921
	Back shovel lead shot	
	Tension easily, low jaw	
	Separate hands and eyes	
	Inaccurate staring	
	Eyes do always stare at the ball	

3.3. *Experimental Method.* In the preexperiment stage, all students were tested for physical fitness and squat and grouped according to this score to ensure that the physical fitness of each group of students was similar, with the purpose of reducing significant differences.

During the experiment phase, the subjects all had wrong action patterns during the squat movement. The subjects could cooperate to complete the entire experiment process to ensure the accuracy of the experiment. After the start of the experiment, the experimental group needs to cooperate

with the teacher for half a year of corrective training, while the control group is simply a control without training tasks.

In the postexperiment stage, lead all students in the order of muscle force and discharge before and after corrective training to verify the effect of corrective training. Lead all students to test them separately, collect these data, and analyze them to get a conclusion.

3.4. *Data Collection.* A number of approaches to data normalization are available, but different normalization



TABLE 2: Data sheet for all athletes' hurdles and step tests.

	A	B	C	D	E	F
First test	2.00	2.26	2.14	2.03	1.97	2.17
Second test	2.21	2.37	2.29	2.14	2.11	2.27
Third test	2.43	2.59	2.49	2.29	2.24	2.38
Fourth test	2.65	2.78	2.68	2.37	2.32	2.54
Fifth test	2.79	2.94	2.86	2.46	2.41	2.66
Sixth test	2.97	3.15	3.04	2.56	2.55	2.78
T	1.549	1.172	1.795	1.333	1.548	1.604
P	0.021	0.017	0.004	0.036	0.007	0.008

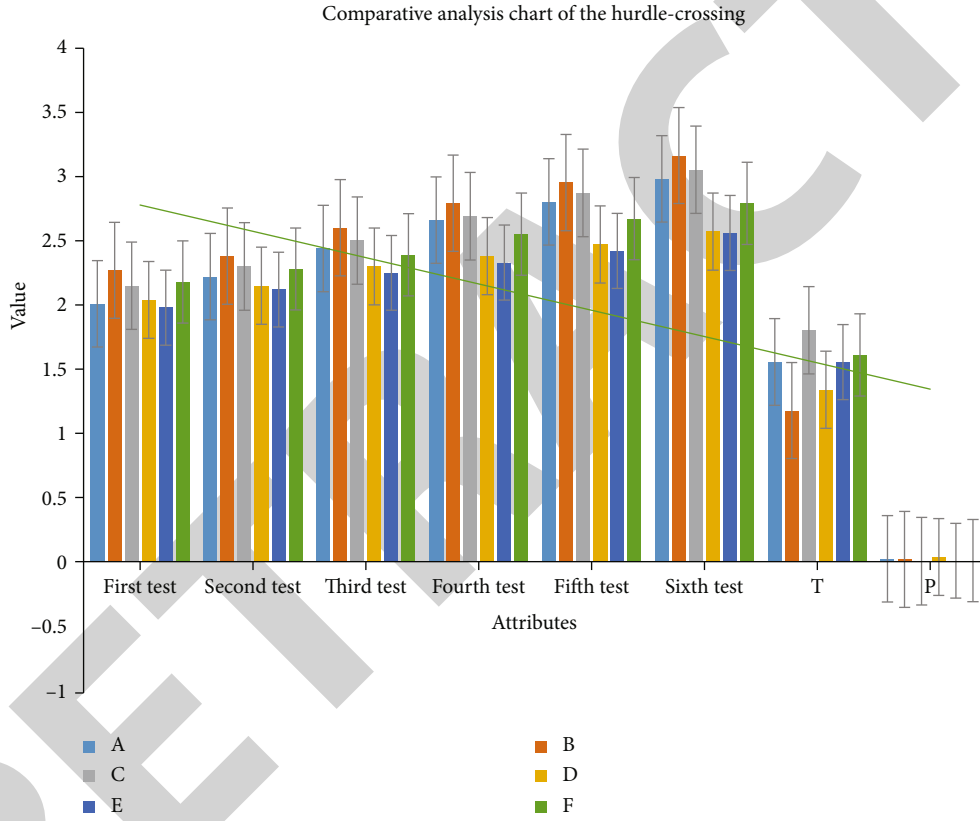


FIGURE 4: Comparative analysis chart of the hurdle-crossing test of athletes in the experimental group and the control group.

methods for data can have an influence on the systematic assessment results. For the negative index normalization method:

$$y_{ij} = \frac{x_{ij} - \min \{x_{ij}\}}{\max \{x_{ij}\} - \min \{x_{ij}\}}. \quad (21)$$

For negative index standardization methods:

$$y_{ij} = \frac{\max \{x_{ij}\} - x_{ij}}{\max \{x_{ij}\} - \min \{x_{ij}\}}. \quad (22)$$

3.5. *Statistical Data Processing Method.*  $k$  is the number of data

in this experiment, and  $\sigma^2$  is the variance of all survey results. The formula for calculating reliability is shown in formula (21).

$$a = \frac{k}{k-1} \left( 1 - \frac{\sum \sigma_i^2}{\sigma^2} \right). \quad (23)$$

#### 4. Application of Virtual Reality in Sports Action Correction

4.1. *Evaluation Index System Based on Index Reliability Testing.* Confidence is defined as the questionnaire's robustness and credibility. In this paper, the alpha coefficient method established by L.J. Cronbach is used. The alpha factor can be gotten by the dependability test of SPSS

TABLE 3: Data sheet for all athletes' front and rear split squat test.

	A	B	C	D	E	F
First test	2.00	2.26	2.17	2.03	1.90	2.26
Second test	2.29	2.52	2.49	2.14	2.08	2.38
Third test	2.56	2.74	2.71	2.27	2.19	2.46
Fourth test	2.82	2.97	3.01	2.35	2.30	2.53
Fifth test	3.00	3.12	3.20	2.46	2.43	2.64
Sixth test	3.11	3.37	3.40	2.53	2.55	2.78
T	2.121	1.932	2.007	1.579	1.521	1.617
P	0.016	0.005	0.005	0.018	0.008	0.008

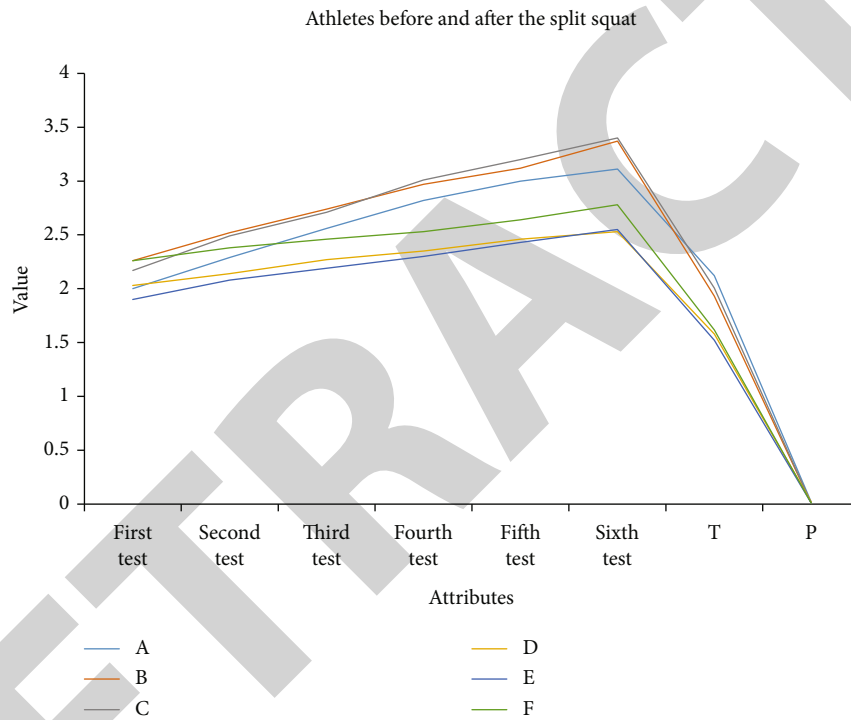


FIGURE 5: Comparative analysis chart of the experimental group and the control group athletes before and after the split squat.

program. It is considered generally that an alpha factor greater than 0.8 shows a great indicator setting, and greater than 0.7 is considered acceptable. Here, we present an overview of the dependability of each kind of an object, and we selected somewhat dissimilar indicators of dependability for each category. The outcome is shown in Table 1.

Table 1 is the data obtained from physical fitness, psychological factors, sports experience and environmental factors have a positive effect on this study ( $\alpha > 0.7$ ), and almost every wrong action will be affected by environmental factors and psychological interference. The more obvious wrong technical actions affected by environmental factors are that the training is not very fixed due to the impact of the training venue. The impact of the living environment and economic conditions is suitable, and the limitation for the start of the experiment is met.

#### 4.2. Comparative Screening Tests for Athletes in the Experimental Group and the Control Group before and after the Experiment

##### (1) Comparative the hurdle-crossing

After six months of corrective training intervention for squats, the students divided into 6 groups used a paired-sample *t*-test to compare the results of functional action screening before and after the experiment. Here, we test their hurdles and steps analysis; the results are shown in Table 2; we make a column chart based on this result, as shown in Figure 4.

It can be revealed by means of paired samples *t*-test that the *P* values of the postexperimental group and the comparison group are smaller than 0.05, and there is a remarkable

TABLE 4: Data sheet of all athletes' active knee-lift test.

	A	B	C	D	E	F
First test	2.03	2.3	2.42	1.83	2.25	2.41
Second test	2.58	2.31	2.39	2.4	2.81	2.35
Third test	2.96	2.84	2.93	3.42	3.21	2.83
Fourth test	4.07	4.12	4.37	4.3	4.38	4.5
Fifth test	4.99	5.31	4.92	5.17	5.11	5.47
Sixth test	5.32	4.85	5.4	4.95	4.89	5.09
T	1.91	2.34	2.16	2.26	2.27	2.18
P	0.010	0.004	0.004	0.015	0.006	0.006

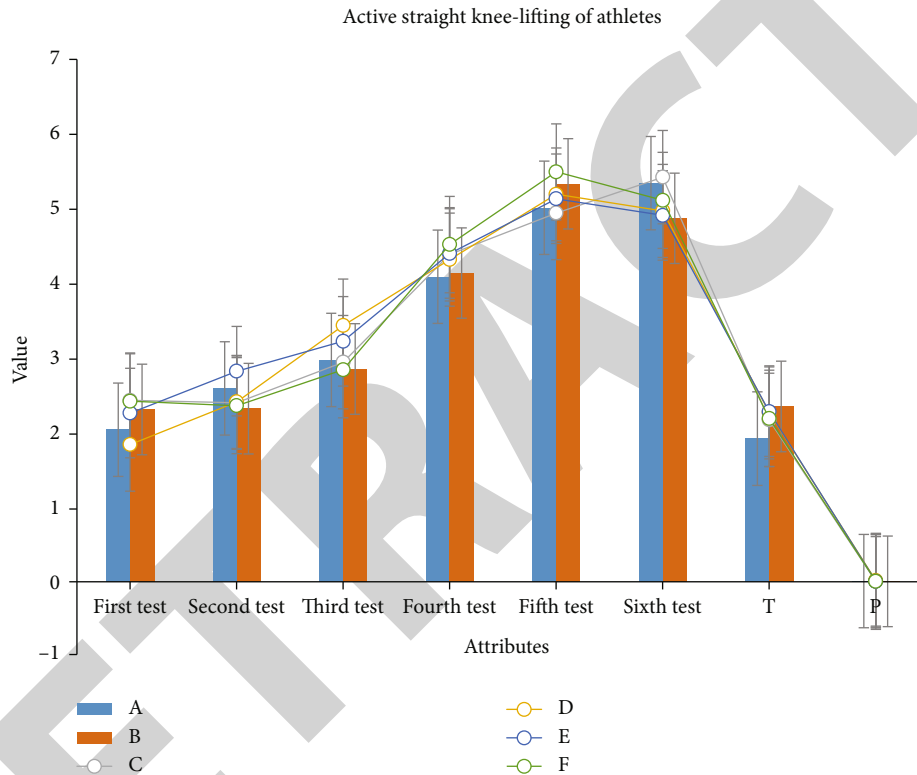


FIGURE 6: Comparison and analysis chart of the test of active straight knee-lifting of athletes in the experimental group and the control group.

discrepancy; the same  $P$  value of the postexperimental group is also smaller than 0.05, which also has a significant difference, indicating corrective training the effectiveness of hurdle training and helps athletes reduce the risk of injury, as shown in Figure 4.

(2) Comparing the athletes' front and rear split squat test before and after the experiment

After six months of corrective training intervention for squats, the students divided into 6 groups used a paired sample  $t$ -test to compare the results of functional action screening before and after the experiment. Here, we test their front and back split squats analysis; the results are shown in Table 3. Relevant data are shown in Figure 5.

The  $P$  value of the experimental group before and after the experiment is also less than 0.05, which also has a signif-

icant difference, indicating corrective training the effectiveness of the front and rear split squat training, and helped athletes reduce the risk of injury, shows that the corrective training of the squat action is helpful to improve the performance of the experimental group's front and rear split squat functional action screening test. The specific situation is shown in Figure 5.

(3) Comparing the test of active straight knee raising for athletes in the experimental group and the control group before and after the experiment

After six months of corrective training intervention for squats, the students divided into 6 groups used a paired sample  $t$ -test to compare the results of the functional action screening before and after the experiment. Here, we carry out their active straight knee lift project test analysis; the

TABLE 5: Data sheet for all athletes' rotational stability.

	A	B	C	D	E	F	G	H
First test	2.55	2.89	2.87	2.38	2.65	2.33	2.43	2.42
Second test	3.02	3.14	2.89	3.35	2.92	3.18	2.12	3.12
Third test	3.91	4.38	4.5	3.81	4.24	4.33	4.13	4.2
Fourth test	5.35	5.4	5.13	5.39	5.45	5.33	5.17	5.23
Fifth test	5.04	5.43	4.97	5.34	4.96	5.3	5.2	5.1
Sixth test	7.41	7.37	7.38	6.81	6.82	7.03	6.78	6.43
<i>T</i>	1.86	2.41	2.23	2.19	2.2	1.8	1.6	1.76
<i>P</i>	0.872	0.987	0.742	0.536	0.572	0.610	0.642	0.645

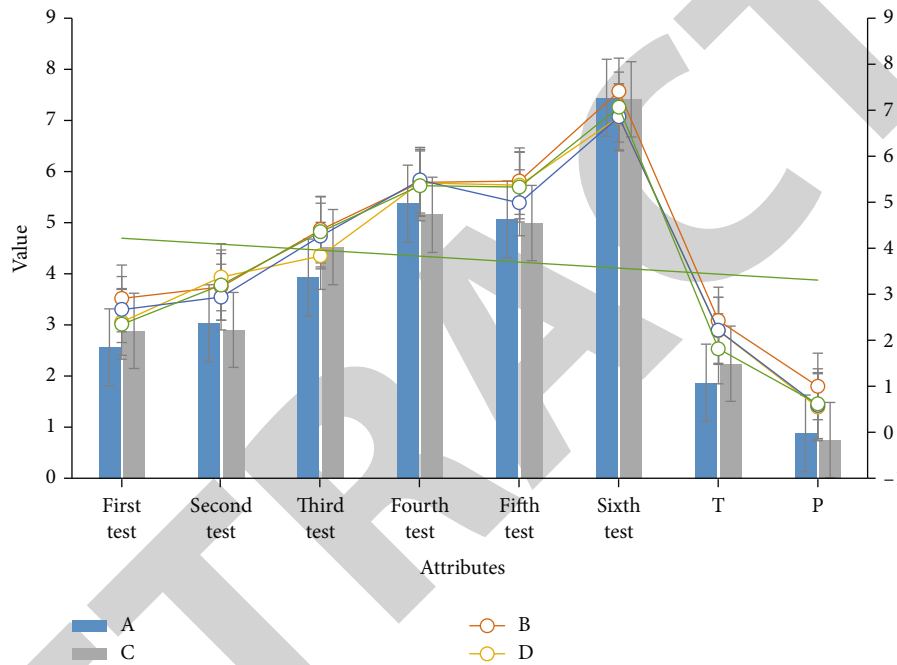


FIGURE 7: Comparison and analysis chart of rotation stability test of experimental group and control group athletes.

results are shown in Table 4. We design a combination as shown in Figure 6.

The *P* value of the experimental group before and after the experiment is also less than 0.05, which also has a significant difference, indicating corrective training the effectiveness of active straight knee-lift training, and helped athletes reduce the risk of injury, shows that the corrective training of squats is helpful to the improvement of the experimental group's active straight knee-lift functional action screening test results. The situation is shown in Figure 6.

- (4) Comparative the test of rotation stability of athletes in experimental group and control group before and after the experiment

After six months of corrective training intervention for squats, the students divided into 6 groups used a paired sample *t*-test to compare the results of functional action screening before and after the experiment. Here, we test

and analyze their rotation stability items; the results are shown in Table 5. We make a combination diagram based on this result, as shown in Figure 7.

The *P* value of the experimental group before and after the experiment is also greater than 0.05, and there is no significant difference, indicating the correction sex training has no direct relationship with the athlete's rotational stability. Regarding the changes in the performance of the control group and the experimental group, there is no remarkable change before and after the experiment in the rotational stability control group after corrective training. The specific situation is shown in Figure 7.

- (5) Comparative squat test of experimental group and control group athletes

After six months of corrective training intervention for squats, the students in 6 groups used paired sample *t*-test to compare the results of functional action screening before

TABLE 6: Data sheet for all athletes squat test.

	A	B	C	D	E	F
First test	1.92	2.12	2.05	2.08	2.24	2.37
Second test	2.87	2.39	2.62	2.49	2.45	2.51
Third test	2.8	3.47	3.01	3.29	3.44	3.3
Fourth test	4.46	3.88	4.2	4.32	3.8	4.17
Fifth test	5.32	5.01	5.37	5.42	5.26	4.92
Sixth test	5.47	5.35	4.85	5.02	5.13	4.93
T	1.82	1.89	2.11	1.94	2.3	2.27
P	0.001	0.001	0.001	0.001	0.001	0.001

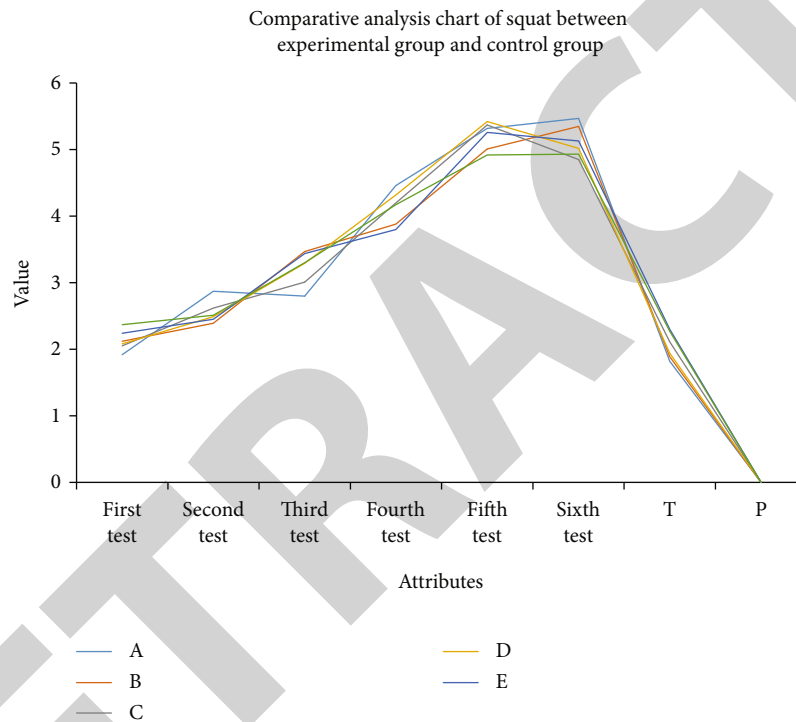


FIGURE 8: Comparative analysis chart of squat test between experimental group and control group.

and after the experiment. Here we test and analyze their squats. The results are shown in Table 6. A pie chart based on this result, as shown in Figure 8.

The data shows that also has a significant difference, indicating corrective training the effectiveness of squat training, and helps athletes reduce the risk of injury, which shows that corrective training of squats is helpful to improve the performance of the squat functional action screening test of the experimental group, as shown in Figure 8.

**4.3. Comparative Comprehensive Test of Experimental Group and Control Group Athletes.** After six months of corrective training intervention for squats, the students divided into 6 groups used a paired sample  $t$ -test to compare the results of functional action screening before and after the experiment. Here, we conduct a comprehensive test and analysis on the athletes. The results are shown in

Table 7; we make a bar graph based on this result, as shown in Figure 9.

It can be seen from Figure 9 that after half a year of corrective training for squats, the experimental group has made more significant progress, and the test results of the control group after the experiment show signs of regression compared to the test results before the experiment. At the beginning of the retraining, the subjects in the experimental group and the control group were randomly selected. There were 4 subjects with pain in the experimental group, but after training, all 4 subjects with pain eliminated the pain. But another person suffered injuries due to uncontrollable factors in actual combat. The experiment in the squat test ( $P < 0.05$ ), and the control group after the experiment is significantly different from the experimental group ( $P < 0.05$ ), so the corrective training of the squat movement can improve squatting is very effective for problems such as wrong patterns and limited joints.

TABLE 7: Comprehensive comparative analysis data table of all tests of six groups of athletes.

Group	Squat		Hurdle step		Squat with legs apart		Active knee lift	
	Before the experiment	After the experiment	Before the experiment	After the experiment	Before the experiment	After the experiment	Before the experiment	After the experiment
A	10	18	14	17	14	18	18	21
B	14	21	16	23	15	20	15	22
C	13	17	12	18	14	19	16	24
D	14	10	16	18	17	15	15	20
E	10	16	12	16	13	17	16	19
F	15	14	14	19	13	11	18	20

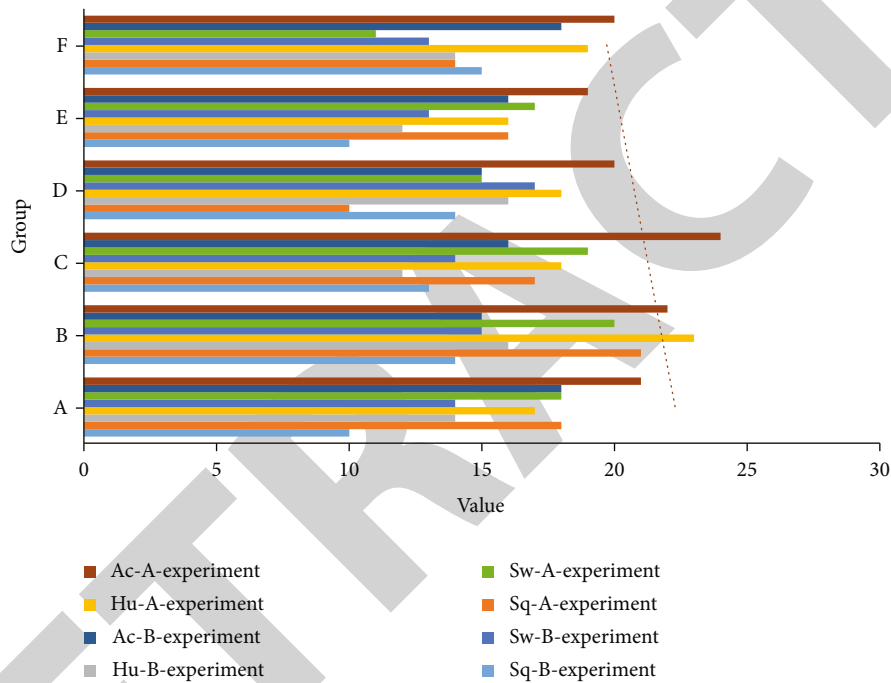


FIGURE 9: Comprehensive comparative analysis chart of all tests for six groups of athletes.

### 5. Conclusions

The unique immersion of virtual reality in the communication process creates a wonderful way of communication, that is, exciting communication. Exciting communication is a new type of communication method that is gradually infiltrating all aspects of our daily life and social life and changing our inherent cognitive and thinking modes. It is a question that needs careful consideration and repeated consideration, but it is undeniable that virtual reality has subverted the survival mode and experience accumulated by mankind since the primitive period. The emergence of new sports action correction will certainly have an impact on traditional correction methods and prompt them to reform. Today, virtual reality may be able to bring innovative power to traditional action correction methods, but the ultimate goal of this innovation is and the problems in the realization process are still waiting for our continuous practice and repeated exploration. It is also necessary to be

vigilant about the communication impact and many hidden dangers brought about by virtual reality, handle the coexistence relationship between upstream and downstream, maintain the ecological environment of the entire sports movement correction, and improve the norms and systems, which also require further discussion and research.

When observing a student's tennis technical movements, it is necessary to adopt a developmental perspective; consider the student's age, the time of learning, and the impact on future technical learning; and always follow the principles of sports biomechanics as a guide from the students hitting process. The action elements shown are multiangle, and the effect of hitting the ball is viewed scientifically. General error correction methods only consider the principles of physiology and sports biomechanics and rarely consider psychological and sociological factors. Experiments have proved that the decomposition training method, repetitive training method and appropriate task constraints have obvious effects on correcting technical actions. In the process of

error correction, pay attention to the scientific nature of methods and means, the acceptability of practitioners, and proceed from the actual situation.

Corrective training mainly includes three parts: one is exercise to increase joint flexibility, the other is exercise to increase joint stability and muscle strength, and the third is retraining exercise. The process of corrective training is to first figure out the movement process to be corrected, then strengthen the defects of joint flexibility, stability, and limited muscle strength, and finally, reshape the movement process to observe sports performance. Corrective training methods are far more than those listed in this article, and the exercise methods listed in this article are not just for judo athletes. According to the results of the screening, the corresponding exercise method can be selected, and the training arrangement can be carried out in accordance with the corrective training method system. There are three levels in the physical fitness pyramid model of competitive sports, and the bottom is the basic function training of the body, which includes joint flexibility, joint stability, and basic movement modes. Therefore, if athletes want to obtain better athletic ability, they must pay attention to basic functional training of the body.

### Data Availability

No data were used to support this study.

### Disclosure

All authors have seen the manuscript and approved to submit to your journal.

### Conflicts of Interest

There are no potential competing interests in our paper.

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