[1]Yan Liu

Bingyan Yu

Yan Zhao

"Research on the construction of internet based aerobics competitive ability assessment model"

Abstract: - A vast field that focuses on restoring motor abilities through exercise is known as sports rehabilitation training, which is also sometimes referred to as recovery athletic exercise. A background in sporting recovery can assist competitors in getting back into peak physical condition, recovering from injuries, preventing additional damage, and better coping with the demands of regular practice. The importance of sports rehabilitation teaching for physical activity is analyzed and discussed at length throughout this research. The definition of sports therapy is presented first, followed by an examination of how it might be used to fitness. Make use of this information as a reference to discover how to include physical therapy in the workout plan you use for sports conditioning. Many tried-and-true algorithms for monitoring patients' vitals over time have emerged as a result of widespread use and advancements in IHM technology, which has led to an increase in the number of such algorithms. The purpose of this research is to investigate the ways in which intelligent health monitoring systems can be applied to the process of developing rehab methods for athletes. It not only provides the structure for a smart wellness terminal, but it also offers the usual ways for monitoring a moving object. Methods such as this include the optical flow strategy, the frame contrast technique, and the background difference method, to name just a few examples. The process of rehabilitation that an athlete went through in X city is presented as an example to show the processes that are included in an ideal study. According to the findings of the study, 92.6 percent of the athletes with injuries were able to make a full recovery with the support of rehabilitative physical exercise. The researchers were able to determine this by keeping close track on the athletes' vital signs in real time using sophisticated health monitoring equipment.

Keywords: Aerobics competitive ability, physical fitness, exercise science, health monitoring, digital fitness tools, sports technology.

1. Introduction:

The speedy advancement in society and the economy, in addition to the general improvement in people's standard of living, have all led to an increased understanding of the need of maintaining one's own physical well-being [(Wang)]. The current population of the world is extremely high, and this, in conjunction with the consequences of many environmental, biological, and other variables, has led to a wide variety of health problems that pose significant dangers to individuals. In recent years, the practice of sports therapy, which places an emphasis on the use of exercise as a therapeutic tool, has grown increasingly widespread. Because of this, it is more crucial than it has ever been to pay great attention to every facet of your exercise regimen. When it comes to preparing performers, the integration of recuperation and fitness is an extremely important component.

According to,[(Wang and Zhu)]Regularly, athletes are required to evaluate their sports training, make decisions, and gain knowledge about the most important aspects and challenges of their sport. Training in physical rehabilitation offers the same kinds of practical benefits to participants as does highly specialized training for athletes. Exercise and various other training methods are emphasized heavily during the rehabilitation process. Finding a strategy that can successfully combine the players' health and their level of fitness is of the utmost importance and should be a top focus. In the field of rehabilitation training, it is usual practice to combine theoretical principles with actual applications of those principles. This sets the path for the use of sports training

[1] Public Course Teaching Department, AnHui Business Vocational College, Hefei, Anhui, 231131, China

*Corresponding author e-mail: hongchuan929@126.com

in the real world and encourages the continued growth of the discipline of sports rehabilitation.[(Chen and Chen)]

People from every aspect of life in today's modern society are particularly interested in learning more about the technologies that detect moving objects. The intelligent monitoring of health technology that is available in the present world has found widespread application and has advanced in leaps and bounds.

According to [(Fu and Fu)] a wide variety of tried-and-true approaches have also been developed in order to finish up the removal of all moving objects. In contrast to fitness rehabilitation, which is accomplished mostly via the utilization of training, sports rehab coach is a specialized form of exercise that is performed for a particular goal [(Fan et al.)]. When it comes to training for an activity, it is essential to devise a routine that is not only original but also forward-thinking. It is imperative that the teaching of physical rehabilitation, which is an integral aspect of sports conditions and physical rehab sports training, be accorded the level of importance and priority that it justifiably deserves. It is necessary for it to devise an original strategy that can also be implemented in real life for physical activity. This can help to ensure that athletes keep their mental well-being and offer them with the excellent rehabilitation treatments they require in order to achieve their goals. It can also provide an incentive for athletes to stay physically healthy. [(Ma)]

The following is a list of the innovative contributions that this work contributed to the field: A unique aspect of sports rehab programs is the use of high-tech tracking and monitoring of patients. It is possible that it will provide helpful reference that can be integrated into the general structure of athletic practice[(Li and Zeng)] Thirdly, it offers athletes with helpful suggestions and instructions that may be adopted to minimize the possibility of sports-related injuries, accelerate the healing process following accidents, and increase overall athletic performance.[(Guo and Huang)]

2. Literature review:

A rising number of investigators are looking into these phenomena. The broad adoption of a sophisticated medical detection system has been made possible by advances in both technology and scientific understanding [(Xie et al.)]. When it pertains to the safety of drivers, there is nothing more vital than the capability of a tire to maintain its tread for the longest amount of time feasible. A car with damaged tires is more unstable, which increases the likelihood of being involved in a crash. Behroozinia created a computational approach for detecting structural faults in tires in order to evaluate the possible of the keen exhaust idea aimed at exhaust fitness watching. This was done in order to analyze the possibility of the smart tire idea for tire health monitoring. This course of action was necessary for the research.

According to [(Chen and Wang)] this is accomplished by comparing the trends in speed signals generated by healthy tires to those generated by damaged tires and identifying any differences. This can provide information on the size of fractures around the rim of the tire as well as the location of the cracks. In order to accomplish this objective, finite element simulation of the smart tire using a technique that involved a rigorous dynamic study [(Guo)]. He also devised, with the help of the model's data, a system for monitoring the subject's health. This method determines the potential sites of fractures by analyzing the acceleration impulses delivered by a accelerator that has been attached to the inner liner of the tire.

According to [(Lei and Lv)] The radial portion of the signal that indicates acceleration has been shown to play a substantial role in the identification of smart tire problems. This has been verified by a number of different studies [(Zhang and Wen)]. This was discovered through attentive observation and study. As the number of intelligent wearable devices continues to rise, there is an urgent need to find a solution to the enormous amount of energy that is wasted and the contamination of the environment that is produced by electronic waste. Gum that has been eaten is a one-time reusable that can be used in which may be carried on the body. This type of technology can be found in wearable electronics routinely stretched the gum in a salt solution of water containing 6 M or even in a salt solution used in Chinese cuisine in order to boost the bubblegum's ionic conductivity and investigate its influence on the health of the persons. This periodontal sensor has accurate cycle effectiveness and a rapid response time of 297 milliseconds, both of which are necessary for tracking the motion of the body. [(Zhu et al.)]

According to [(Jiang and Li)] it also has the potential to be used in the monitoring of the health of humans in real time. Electric vehicles are going to play a significant role in the transportation system in the not too distant future. Recent developments in problem detection, diagnosis, and forecasting for electric drives are partially responsible for the increased dependability of electric vehicles. Permanent magnet synchronous motors have found widespread usage in a wide variety of industries due to their improved fluid economy, higher power weight, and overall efficacy. These benefits have contributed to the drives' widespread adoption. As a result of Krishnan et al.'s development of an intelligence digital record, it is now possible to monitor and forecast the behavior of synchronous motors that make use of permanent magnets. They map the input distances using neural networks that are armed with artificial intelligence and fuzzy logic in order to make a prediction regarding the lifetime of a set of inert magnets. There are now two approaches that can be used for monitoring and predicting the performance of electric vehicle engine. The use of optical health surveillance in real time with mobile electronics is proposed as a new frontier for remote wearable medicine .The authors of the study suggest that this could be accomplished. The virtual reality system has been improved by the incorporation of bendable electronics. This could make it possible to do intelligent illness diagnosis at a distance by making it possible to immediately evaluate biological data and making it possible for patients and medical experts to communicate with one another remotely [(Xi)]. included a high-level summary of recent developments in the investigation into sensor flexibility and augmented reality medical equipment. The authors offered intelligent remote diagnostic devices and discussed the utilization of augmented reality medical devices for remote diagnostics making use of flexible outside medical sensors. Because it is useful for analyzing the operation of an extensive range of structures through the appropriate processing of data and interpretation, the field of health system monitoring is fast expanding.

According to [(Pu and Chen)] this is one of the primary reasons for the rapid growth of this discipline presents a revolutionary method that increases the performance of conventional optical fibers with the intention of utilizing this method for the purpose of structural health monitoring. Micro braiding an optical fiber accomplishes two goals at once: first, it enhances the mechanical qualities of the optical fiber; second, it makes the optic fiber more manageable throughout the production process conducted research into the challenges faced by the aerospace industry when attempting to monitor the well-being of spinning structures.[(Deng et al.)]

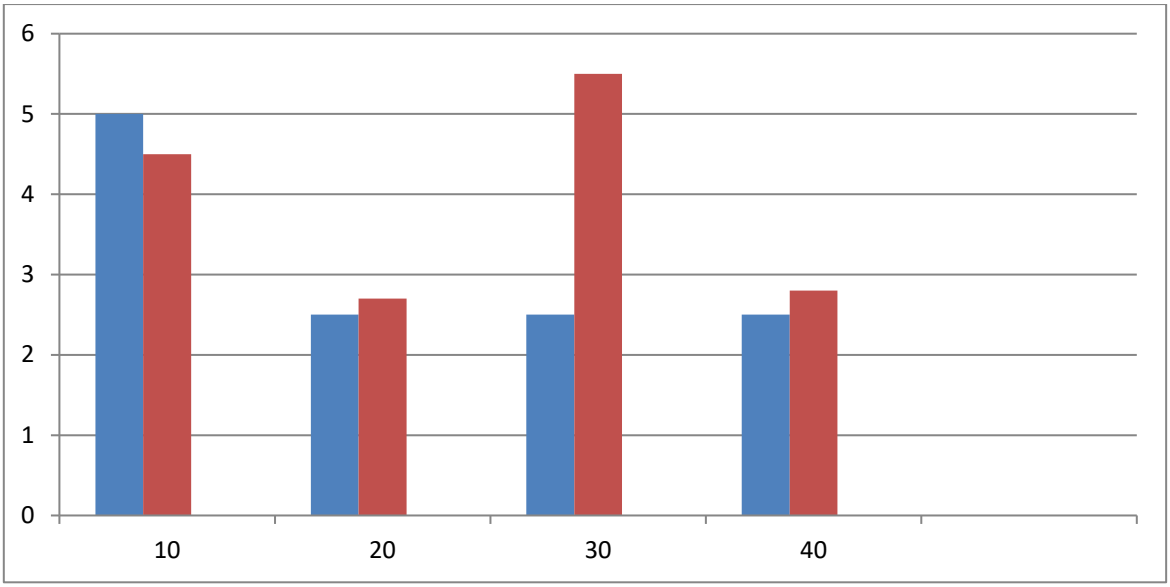
3. Methodology:

The collecting of information pertaining to human health is the primary function of a smart wellness terminal. An alert is sounded by the terminal if it determines that a person's health is not behaving as it normally would. If anomalous monitor items are in need of prompt treatment in an unforeseen situation, the device in question needs to locate them and submit their exact location to a healthcare processor server. Only then will they be able to receive immediate medical care. The provision of urgent medical care, as well as patient monitoring and treatment, is facilitated as a result of this. When the settings of the monitoring terminal have been modified to enable it to collect health data, the information will be uploaded to the clinical analysis server in a format that is standard shortly thereafter.

In the next part, we will discuss how the RSSI placing method is incorporated into the algorithm that determines precise positioning.

The strength of the signal that has been received. A sign (RSSI) placement method determines the least probable the line of sight distance from the device that broadcasts and the target that is being evaluated by using features of the fading of a radio signal throughout travel and its direction of transmission. The relationship between the RSSI rating and the distance, both under perfect and non-ideal conditions, is depicted in Figure 1

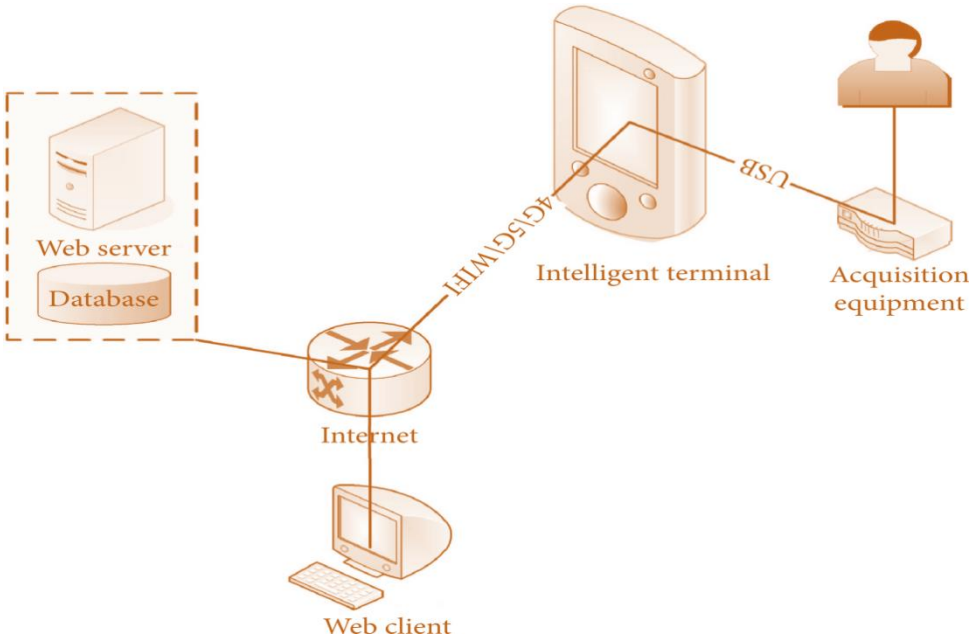
Figure 1: Connection among RSSI worth and space in perfect and non-perfect surroundings.



The ease of implementation of this strategy can be directly attributed to its straightforward nature. However, the signal from the radio can be disrupted by interference from the surrounding environment, which can change the RSSI significance and decrease the accurateness of the positioning. The reason for this is that the process of signal transmission is extremely vulnerable to disturbance from the outside world. When utilizing the RSSI placement mechanism, however, this indicates that we need to give careful consideration to occlusion, reflection, and refraction in addition to occlusion. In its place, the refinement procedure of the algorithm ought to be utilized in order to make the necessary adjustments to the error. This is as a result of the impossibility of escaping the current circumstance in any way.

A smart terminal-based gadget for monitoring vital signs is broken down into its component elements and illustrated in the diagram found in figure 2

Figure2: Schematic drawing of energetic signs nursing scheme founded on keen fatal. (Adopted from,hindwai)



Visual movement is a pure and real method of describing visual gesture. It's a word for how quickly the scene's pixels are changing right now due to the presence of motion. It looks at how changes in the gray scale of a photograph over time correlate to the motion and arrangement of objects in the image. The precision of the

calculation is dependent on whether or not the assumption that the grey gradients moves gradually across the image holds true.

Efforts to increase the algorithm's effectiveness have led to the development of a plethora of new and improved algorithms for employing the optical flow method in recent years. Even though it can characterize data from the target's periphery with precision, the local optical flow technique is particularly vulnerable to noise. The global optical flow method outperforms its local light flow counterpart in terms of both performance stability and the capacity to gather data on optical flow throughout an entire image. We'll assume for the time being that each pixels in a picture stream has the same gray tone. When the timer expires, a point's gray value is represented by. It's safe to presume that a second's worth of time hasn't changed the gray scale of the pixels while talking about digital images.

It is possible to arrive at the following result by first subtracting from each side of this equation and then dividing by simultaneously:

$$p(u, v, w) = p(u, v, w) + \frac{\varphi p}{\varphi u}\ \Delta u + \frac{\varphi p}{\varphi v} + \frac{\varphi p}{\varphi w}\ + \Delta w + \varphi$$

The value denoted by in the preceding formula represents both the higher-order infinitesimal value and the second-order infinite value of the Taylor series. When this condition is met, the value of will be 0.

$$\frac{\partial p}{\partial u}\ \frac{\Delta u}{\Delta w} + \frac{\partial p}{\partial v}\frac{\Delta v}{\Delta w} + \frac{\partial p}{\partial w} = 0$$

The optical flow approach is currently playing a significant role in research efforts within the field of vision in computers and other disciplines that are closely related to it

$$Y(u, v)2 = \iint (d_u^2\ + d_v^2 + g_u^2 + g_v^2\ )dudv$$

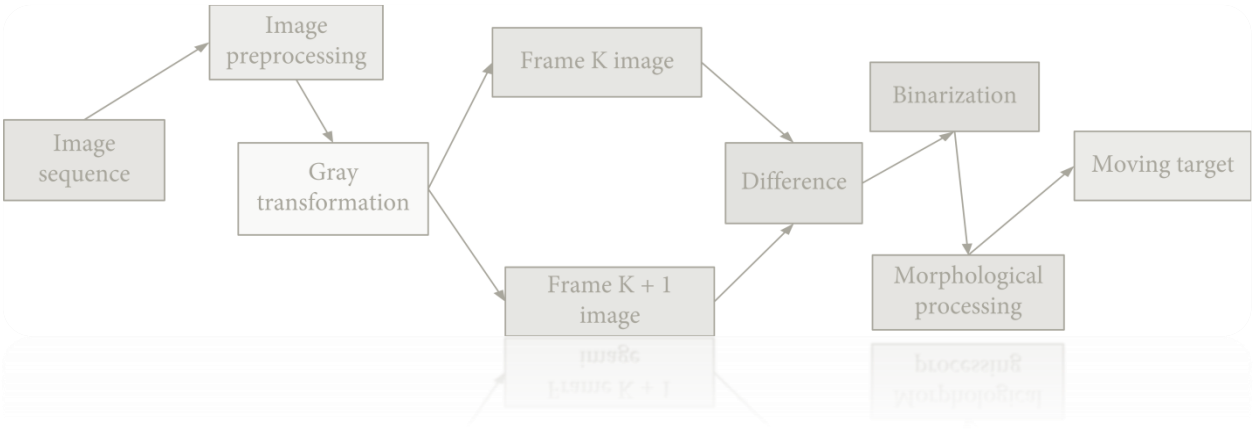
$$E = \iint [\ e^2\ (u) + ay^2\ (u)]dudv$$

The optical flow approach is currently playing a significant role in research efforts within the field of vision in computers and other disciplines that are closely related to it. It is possible to recognize objects in motion even if you are unable to commit every aspect of the flowing scene to memory. If, for instance, the fundamental limiting equation for the flow of light issue and the continued retention of shades fails in a given condition, then the issue cannot be solved. This is because gray scales must be preserved. This is merely one of several scenarios! Due to the lack of precision inherent in this method, there is also the possibility that the target won't be reached. The approach is restrictive in a number of respects, and the computation is laborious and time-consuming as a result of the intricate nature of the algorithm. Despite the fact that the light flow method has been subjected to substantial research and debate within the academic community, which has resulted in the introduction of various superior computations, it is not feasible for use in devices that demand high speed of detection due to its deteriorating real-time performance. However, when applied to real-world scenarios, creating a fully comprehensive visual flow model that operates in real time continues to be a challenging task.

One of the most common techniques for identifying moving objects is called the frame differential approach. This technique is a form of pixel-based temporal processing. The addition operation is performed either among two frames that follow or between three successive images of an animation sequence in order to separate the region of interest from the remainder of the image. In its most basic form, the frame difference approach involves selecting two images that are located in successive frames in time, removing the pixel values that correspond to create an additional image, and then applying procedures to the newly produced image. The description of the frame differential technique has been condensed down to this point. Though the rate of change in pixel value at a certain location does not reach a certain threshold, then that region is considered to be part of the background even though there is no activity taking place there. However, in the event that the number of pixels shifts by a margin that is more than the thresholds, it is concluded that motion is occurring at the specified point. Rather, mobile targets are identified as existing at those locations in the image where there is a significant enough fluctuation in the number of pixels across the area for it to have been brought about by the motion of the objects depicted in the picture. If the amount of variation in the pixel values within a region exceeds than a

certain threshold, then that region is deemed to be a moving target. By vigilantly monitoring each of these regions, you will be able to zero in on the specific portion of the image that contains the moving object and pinpoint its precise location. Due to the incredibly short amount of time that passes between any pair of frames when using the frame differential approach, real-time performance is substantially improved. The algorithm is quite straightforward and uncomplicated, which makes it very easy to put into practice. Despite the fact that this is true, the antinoise capacity is low, and it is very susceptible to being affected by noise from the outside. The flowchart for the frame differential method is displayed in

Figure 5. Flowchart of the frame alteration process.



At the moment, the primary variations of the frame difference approach are the 3-frame change method and the 4-frame change technique. The fundamental idea is the same. The following is an explanation of the theory utilizing the three-frame difference approach as an example.

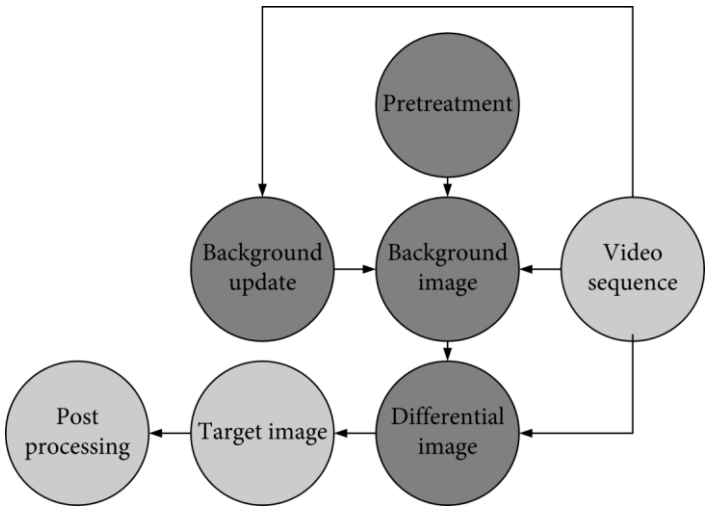
$$\Delta K_w(u,v) = |K_{w+1}(u,v) - K_w(u,v)|$$

$$Q_w(u,v) = \{\begin{matrix}1\\0\end{matrix}, R_w(u,v) > W$$

Related Change Technique

The idea that underpins it is analogous to that which underpins the frame difference approach. When using a picture from the current selected frame, the most notable distinction is that it gets rid of any items in the backdrop image that are moving when it applies that image. There is not a single piece that can be seen moving around in the backdrop photo. The most important step is to carry out a difference operations between the picture of the active frame and the picture of the backdrop, and then to store the point in memory that represents the foreground that has the largest difference between the two pictures. The method is simple to both compute and put into action in the real world. Additionally, it is stronger in picking up moving objects against backgrounds that are still. When utilizing this method for object recognition, you will inevitably face recurring issues such as front a simulation, backdrop setup, and backdrop updating, all of which must be taken into consideration. The conceptual modeling serves as the foundation of the algorithm. In order to identify the subject of interest, it is required to construct an accurate backdrop model, which needs to remain current at all times. Only then can the subject of interest be identified. After that, it takes an image of the currently active frame and removes it from what is left of the backdrop. After that, morphology filters to the image that was produced as a result in order to provide a clear picture of the object that is moving. As was mentioned in the beginning, the frames difference approach is unable to eradicate a moving target picture entirely. However, the backdrop difference method is an excellent alternative to consider using in this situation. Background modeling and background updating approaches become increasingly significant when the scene is dynamic and complicated or when there are components in the backdrop that cause disturbances (for example, shifting illumination or background disturbances). The method includes various stages, such as image preprocessing, the building of a backdrop model, recognition of a foreground target, post processing of a moving target, and update of the background. Figure 6 depicts a schematic representation of its key operational components.

Figure6: Block diagram of background differential principle.



This sets the current frame picture as the input, the present background image as the current image, and the image in binary format those results from the subtraction operation as the respective values. If we assume that is the location coordinates of the pixel point, then the formula below may be used to express the image after it has been processed using the background difference method.

Result and discussion:

Intelligent Monitoring Software Running Speed Test:

To run the monitoring program on the various Android mobile terminals, it engaged the help of five different students. The physical characteristics are determined by filtering information gathered from 20-second ECG and breathing readings. To accomplish this, it contacts the System. At the outset of the algorithm and completion of the code, function from the Java class library is called. This displays the total execution time in milliseconds by subtracting the initial and final timestamps.The numbers A, B, C, and D all require their own unique mobile phone models. The results of these tests are shown in

Table 1. Runtime (MS) for software to process 20 s of data.

SAMPLE				
4G memory	88	85	83	82
8G memory	112	113	114	115
6Gmemory	88	78	75	71
8Gmemory	51	54	55	58

Table 1 show how the software's cycle time varies significantly with the amount of processing power and memory available in the mobile device. While the immediate requirements of physiological sign monitoring are met, the program only has to operate for about 85 milliseconds per day to process 20 mins' worth of data, and it only uses 3 megabytes of RAM on the mobile phone.

Table 2's statistical findings make it evident that Google's mobile terminal has a smooth connection to the Web server, which leads to an improved operator understanding. In calculation, doctors and nurses can access the server's from any computer or Samsung mobile terminal by just opening a web browser. Once they've signed up, they'll have access to every patient's records and can weigh in on the accuracy of the predetermined diagnosis. Administrators can perform upkeep during this time, including removing and updating user profiles and historical data.

Table 2. Reply time of web waiter under the same net setting.

Mobile network	USER LOGIN	UPLOAD FILE	RECORD QUERY
4G	0.5	8	0.9
5G	0.6	5	0.4
WIFI	0.8	7	0.6

The term "core" refers to the muscles in the trunk of the body. These include the back, pelvic area, and hip joints. Managing the tilt of the center of mass and transmitting the force produced by both legs are both skills developed through core stability training. The key factors affecting the core are the human ability for innervation, the capacity to coordinate breathing and movement, and the strength provided by the core muscles. The supporting data is included in

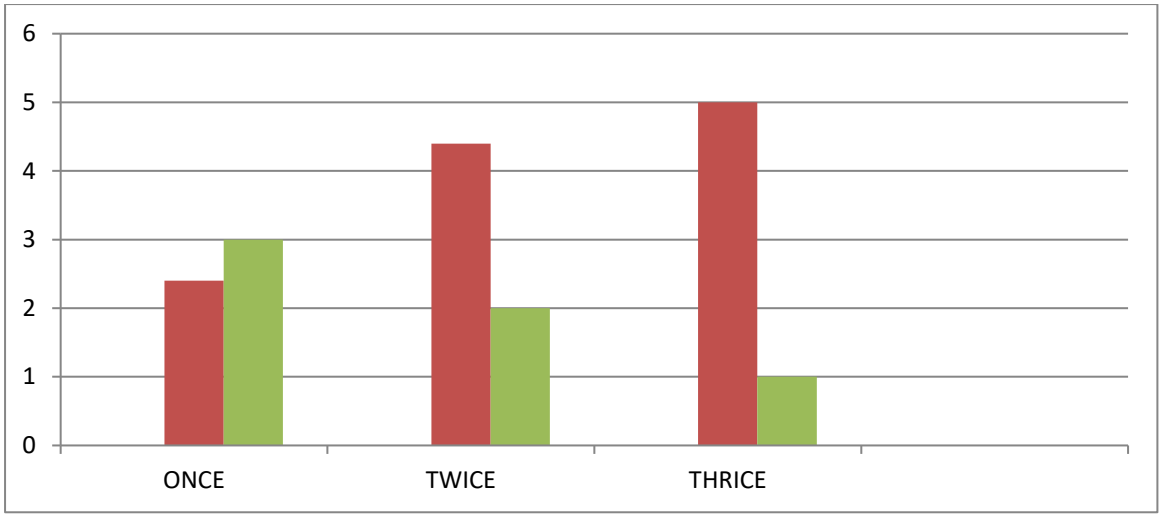
Table 3.

Core forte training incidence.

Preparation act	Amount of sets	Occurrence	Hold period (s)	Time intermission (3s)
Prostrate up on the sphere	2	10		30
Back up on the sphere	2	15		30
Bend over the sphere	2	10		30

It can be shown in Figure that after three cycles of rehabilitative exercise, 92.6% of participants were deemed to have recovered from their sports injury. Even after taking part in physical therapy, 7.4% of injured athletes still have trouble getting back into action. Most athletes who sustain injuries while participating in sports are able to achieve full recoveries with the help of bodily therapy.

Figure.7 Sportsperson's retrieval after wound in 3 bodily exercises.



The improvement of people's material living conditions throughout time has led to the development of data- and intelligence-driven intelligent health tracking stations. As sensor technology has improved, it has delivered additional precise medical statistics aimed at brainy nursing; letting people to more easily recognize critical physiological signals without leaving their homes.

Arguably the most important parts of preparing for sports are physical exercise. Sports training often focus on developing mental toughness and tactical flexibility. In order to maintain their health, we need to take a new approach to medical treatment by opening an industrial physical rehabilitation center. Combine expert sports conditioning with studies on the basic root causes of sports injuries and players may regain their simple bodily capability and progress their level of exercise.

When discussing an athlete's return to health via exercise, we typically refer to what is technically defined as "physical rehab training." In the event of an athletic injury, a rapid diagnostic can be carried out to pinpoint the precise origin of the problem. To accomplish this, it employs effective sports rehabilitation activities that can reduce exercise-related pain and improve a person's capacity for everyday movement.

7. Conclusion:

There has been a rise in both the difficulty of competition and the incidence of sports-related injuries in recent years, as athletes have been asked to participate in more and more tournaments. Injuries can be avoided with the help of rehabilitation programs and consistent physical activity. Managing serious injuries and treating preexisting conditions with well-planned workouts can help prevent unnecessary functional deterioration. Injuries are handled more effectively, performance is improved, and athletes are given more chances to shine.

Athlete competitiveness is strongly correlated with physical fitness, and physical fitness itself is a strong predictor of overall competitiveness. A large percentage of each day's practice should be devoted to strengthening and conditioning an athlete's body. Since the introduction of cutting-edge health monitoring technologies, the field of athletic training has embraced physical rehabilitation training as a fresh approach to conditioning. Rehabilitation training can help athletes get back in shape, recover from injuries, avoid further harm, stay healthy, train harder, and perform better overall. Starting with the concept of physical rehabilitation training, this essay explores its numerous potential applications in the realm of sports conditioning. The relevance and use of physical rehab training in relation to athletic endeavors, as well as the current state of physical therapy, are explored.

Acknowledgement:

1. 2021 Anhui Quality Engineering Teaching Research Project: “Practical research on the integration of curriculum ideology and politics into the teaching of sports clubs in higher vocational colleges”(Project No. 2021JYXM0162)

2. 2020 Anhui Provincial Quality Engineering Teaching Research Key Project: “Research on the Physical Health Management of Higher Vocational Students under the Background of Smart Campus”(Project No.2020JYXM0188)

3. 2019 Anhui University Humanities and Social Sciences Research Key Projects:“Research on the Feasibility and Implementation Strategy of Adding Additional Physical Education Examination to Anhui Normal College Entrance Examination under the Concept of Quality Education”(Project No. SK2019A0987)

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