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Football Player's Health Monitoring Algorithm using Convolution Neural Networks

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ABSTRACT: Health management and big data have grown and developed in recent years with the growth of information technology. Big data are needed in order to extract relevant information from proper analysis and shape. The study assesses the state and possibilities in the health management sector of applications for big data. The results reveal that intelligent wearable devices are the most widely used big data in health management. There are also significant prospects of big data applications for football players' surveillance systems for mental health and chronic illness management systems. The Smart wearable device applied to several aspects of sport: education and training in the field of sport, real time monitoring of physical exercises of football players, collection of heart rate, calorie use, training steps and pathways, blood pressure, oxygen in the blood and other physical exercise data;

We can also gain the intensity and the length of the physical exercise of the footballers in school by monitoring the cardiac rate; we can also gain an overall understanding of the situation of the physical exercise of football players at school by calculating the amount of time consumption and by measuring the number of steps and the pathway of soccer. The efficiency of the work proposed by the experimental findings of the proposed study is shown.

I. INTRODUCTION

Because people are paying greater attention to health issues, people are paying increasing attention to health items, especially soccer players. More and more soccer players use intelligent wearable technologies with societal development and economic progress. Intelligent wearable equipment is being used by more and more footballers to check health problems. More and more people are starting to take care of the management of sports health. The smartphone industry has expanded to an unparalleled height with the development of the electronic communications industry. Big smartphone producers like Apple and Samsung met with mobile innovation obstacles during this time.

The evolution of intelligent gadgets is turned into intelligent wearable devices, and many intelligent wearable devices have emerged like mushrooms. Approximately 6,75 million smart wearable appliances were sold in Chinese in 2013 and it is anticipated to approach 73,5 million in 2016 and become an immense market of 16,94 billion yuan [1] as smart wearable appliances have to contact the body and the benefits of body detection are to be achieved. Many manufacturers have previously launched smart, fitness-based wearable gadgets, and the development of smart wearable sports devices will be unparalleled. As the smart wearable device is a new product in science and technology development, the definition of the smart wearable device does not come to any uniform conclusion [2].

This study analyses and analyses football players in several countries through the analysis of tailored education of football players, sports prescription, theory and allocation, cognitive dissonance and theory of conduct enhancement. This work explores the optimization effects [3] on the sports health management of football players by using research on the status quo of the physical condition of football players and other elements. We can also grasp the varied functions of wearable devices and study the different functions of different intelligent wearable devices by supporting society, governments and companies and particular measurement of the physical state of football players. The smart wearable devices are currently fast evolving and many types and volumes of smart wearable devices are available. It is now a priority for our football players to comprehend the genuine advantages of smart wearable devices. Secondly, a focused choice of appliances should be made and, finally to fulfil the objective of sport health management, we should prepare a sound sports health plan to improve football games by mobilising their physical quality. The important contributions of the paper are as follows:



Analysing the state and potential of big data in health management

- There is also considerable promise of studying big data applications in football players' monitoring systems on mental health and chronic disease health systems
- Use clever wearable equipment for various sporting activities
- To demonstrate the efficacy of the study via experimental results

II. LITERATURE REVIEW

Baidu Encyclopedia defines intelligent wearable devices as 'wearable intelligent devices' by employing wearable technology to intelligently design and create wearable devices, such as glasses, gloves, watches, clothing and shafts. Li Yang believes that "wearable devices refer to smart devices that are independent from the operating system; application of the system; upgrades and scalability that are worn by the human body; and interaction between them." Li Yang agrees that wearable devices are smart devices that take over an independent operating system, have system application, upgrade and interaction. The research on smart wearable devices is less, just as scientific and technological news reports, national and foreign research on smart wearable devices in the sport field are less, so there is a degree of innovation in this study for sport research on smart devices to be a benchmark and a benchmark.

Smart Wearable Devices Development and Evolution. When the first pair of crystal glasses debuted, early wearable devices may be traced back to the 13th century. The abacus, the rudiment of smart wearable gadgets, was founded in China in the 17th century. In 1762 the pocket watch was invented by John Harrison. The first watch came into being in 1907. People started the age of clockwork. In 1977 the HP 01 calculator clock, which sold for \$600, was designed by HP. In 1978, computer shoes were built to predict the outcome of roulette. In 1993, the Pathfinder system was finished by BBN. The system is a wearable GPS-equipped computer and a radiation sensing device. In 1994, Steve Mann invented a "wearable wireless camera" with the introduction of wearable cameras, which could broadcast point-to-point images from head on analogue cameras to Sgi base stations using an amateur tV frequency. Seiko debuted a Windows 95-compatible intelligent clock rupture in 1998. In 2010, Nike created the device Nike + SportBand, one of the founders of intelligent wearable equipment, which can "connect" with sneaker sensors and let users know about how things work. Google published Google lenses in April 2012 that offer smart wearable gadgets to the public. The smartwatch Samsung equipment was announced in 2013. The Apple Watch was debuted in 2015 and was the first year of the use of smart wearable devices in 2015.

III. MOTION CAPTURE HARDWARE PLATFORM DESIGN

In general, the model presented in Figure 1 can be utilised for description for single-person motion capturing according to the principle of inertial motion capture equipment and current technology. Users are wearing 11 motion sensors distributed in the upper left arm, left forearm, right large arm, right forearm, left thigh, right leg, right thigh, right leg, right leg, head, chest and waist of the model. Each sensor of motion produces acceleration, magnetic field forces and inertial parameters of angular velocity. The sensors are connected by a CAN bus, which provides power and reliability to the sensors. The focuser is the connection of the sensor to the computer. The sensor node sends the data first to the focal point and then transmits it to the recipient. The receiver sends data via a USB port to the PC. The focuser and the sensor are wired, and wireless communication between concentrators and computers is carried out.

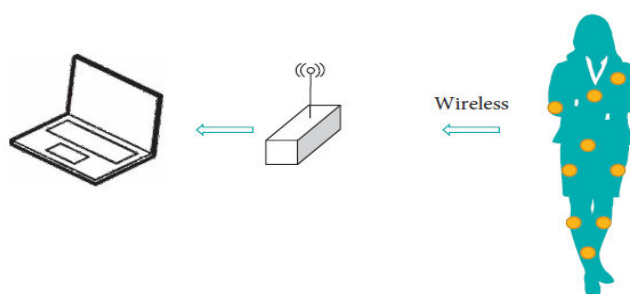


Figure 1: Motion system model

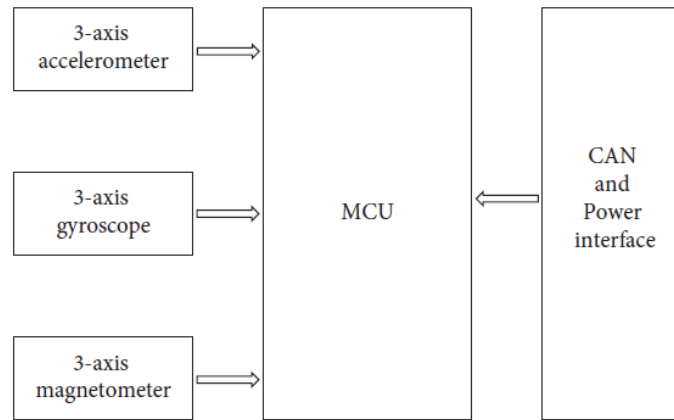


Figure 2: Movement sensor system block diagram

Table 1: Chip parameters

Type	Name	Parameter
Accelerometer	MPU6050	±250/500/1000/2000°sec
Gyroscope	MPU6050	±2/4/8/16g
Magnetometer	HMC5883 L	±8gauess
MCU	STM32F103	90DMIPS
CAN	SN65HVD230	1 Mb/s

1.1. Part of the sensor movement.

The Motion Sensor capabilities include data gathering, set-up of the attitude angle and wired communication for three different types of inertial sensors. The hardware system block diagram is displayed in Figure 2. As may be observed in Figure 2: MCU, acceleration sensor, sensor, magnetometer and CAN interface are essentially five components of the motion sensor. The MCU includes an asynchronous serial communication bus (I2C), UART, keys and other components. It regulates a number of node operations. Wire powered nodes, which controls the collection of data, the calculation of the attitude angle and the three sensors' CAN transceiver. The most important chips employed on motion capabilities include St STM32F103 (MCU), InvenSense STM32F103(3-axis gyroscope) and honeywe11 (3-axis magnetometer) and D230(can transceiver) and sn65hv. Table 1 shows the parameters for each chip.

IV. REPORT ON THE TOTAL SEXUAL ACTIVITY OF FOOTBALL PLAYERS AND CALORIE CONSUMPTION

An essential approach of understanding the activities of football players in a specific estimate of sports energy consumption is In order to assess human energy consumption, calories are an important reference index.

The energy consumption of football players in stage actions can be calculated in several methods. The most common methods of heat measurement currently available are indirect side heat methods, double standard method of water detection, method of cardio frequency detection, method of pedometer detection and method of triaxial sensor detection acceleration [12]. There are advantages and drawbacks to every detecting method. Currency monitoring, heart rate monitoring, and triaxial acceleration sensor monitoring are now the popular approaches for the energy monitoring of intelligent wearable devices. Monitoring step-counting basically counts the number of steps of human movement and evaluates the human body's energy consumption. Because some unconditional running and walking movements not only demonstrate that the human body's energy consumption is the distance of number of steps from the moving position, a big error is made in calculating the footballer energy consumption using the Step Counting Principle [13].

The equipment requirements are simple and the accuracy of cardiac rate measurement is likewise excellent, based on the comparable intensity of measuring the energy consumption of soccer players. However, the external environment and internal differences of testers easily change the cardiac velocity leading to detection. A mistake exists. The measurements of human energy consumption using cardiac rates, measuring steps, 3D accelerations and other related



concepts were also shown by Meijer and other related studies to be the perfect method for determining the human body's consumption of energy [14].

V. INTELLIGENT WEARABLE DEVICES CLASSIFICATION AND FUNCTION

Intelligent wearable gadgets exist in numerous varieties. "From an intelligent device's wearable product's standpoint, 30% of the goods are worn on the wrist and 26% and 22% are worn on the top body and head, respectively. The wearing parts criteria of 15 percent of items are not defined. However, the smart wearable gadgets seem to feet are the least loved component of the product and only 7% of products choose the feet." [13].

A distribution chart is classified by function with intelligent wearable devices. We can see from this that the present wearable devices are employed mostly in the sphere of sports fitness and medical care. The use of wearable systems to monitor ECGs while walking, running and any other activity may prevent heart disease by controlling the cardiac status of users. The user is using a wearable sensor to measure heart rate changes and number of steps during exercise, compute the heat and calories expended by the user, evaluate the user's level of health and develop a fitness plan that is appropriate for the user.

The wearable device is separated into position depending on the wearing position and the temperature monitoring circuit function module, and the wearable device is classified in functional categorization into the following categories. Electronic gadgets worn on the head, neck, arm, wrist or finger or incorporated into clothes or shoes can be wearable devices. Wearable gadgets are usually worn on the wrist, as can be seen in the illustration. It's because people wear braces or watches, and the wearable equipment on the wrist is portable, power consumption is low and small.

VI. THE VALUE OF SMART WEARABLE EQUIPMENT IN SPORTS

According to Fjord's survey of 27 famous wearable smart appliances, "about 70 percent of these items' major tasks are in sports and healthcare, 23 percent are social communications and the rest 7 percent are used to monitor and improve sleep." Almost all smart wearable devices have one function in all the listed smart usable devices, namely the collection and collecting of human motion data, which suggests that smart wearable devices [15] are of major development value in sports.

Currently, different smart items are on the market, such as medical and health products, smart rings, smart headbands, smart straps, intelligent glasses, smart cars and clever anti-loss devices. The fundamental need for smart equipment is easy operation and its development trend is intelligence.

It is split into the following five groups according to the application functions of the equipment.

The first category is equipment for life-sports health. This type of equipment primarily collects data on human movement, health physical fitness and lifetime and rest data.

Products are mainly used in heart rate surveillance, exercise measurement, measurement of blood oxygen, sedentary reminders, monitoring of sleep quality, exercise mode, monitoring of body surface temperature and consumption of calories. For example, obese persons can design themselves a reasonable training plan using the exercise record and calorie consumption calculating function [16].

They can control the heart rate of the workout, reach their personal workout targets and increase efficiencies of physical exercise under the supervision of the equipment. This type of technology is used to help people comprehend their physical problems, identify their body anomalies in time, and monitor the process of changing different body indicators. Live sports health goods are a key aspect of the intelligent wear market in the current environment, in which consumers pay more and more attention to their health issues.

The second category is equipment for leisure and entertainment, particularly to suit daily people's needs for leisure and amusement. Google glasses, for example, can receive information notifications and remind you in good time to prevent missing important information; it also supports voice input, so that you can process important information received in due course without having a negative effect on the use of mobile telephones. Google glasses also include a convenient photography feature, which can enable users capture 5 moments in time of wonderful scientific programming. VR is a smart virtual glass that also features a high-definition display function that can realistically generate game photos and



movies, boost people's experience and enhance the 3D vector sound field impact that gives people a sense of being on scene [17].

Smartwatch products and intelligent clock features are also available with expanded functions such as mobile phones, voice browsing, message push, call reminders, and smart alarm functions, so that people's life is convenient.

The third type is safety devices that mostly address elderly and children's needs. Items for children are mostly reflected in products for child watch. Kids' phone calls can be remotely monitored by guards. The special location of kids can be known and the family number can be set through the GPS positioning system. If needed, children can be contacted in time and communication can be joined via check record friends and refuse to add foreigners in order to ensure further safety of the external surroundings of children. The telephone watch plays a communication function in comparison with the mobile phone, but it is more practical for youngsters to use. Smartphone clock is also used as an alarm when the clock collapses, making the phone clock a real help for parents to find their kids in time. In order to ensure that the family is able to understand the whereabouts of senior in time, security goods for the elderly usually use the GPS positioning function.

The fourth type of products is medical equipment and health equipment principally designed to meet the health indicators of individual groups of people [18]. For example, a motive "physical exam doctor" is equivalent to the household's finger clip measuring tool. The health indicators of the human body can be automatically detected at any time including heart rate, blood oxygen, blood pressure, respiration rates, PI and other indicators, upload data, produce physical examination reports, and make advice on analyses and are a health care housekeeper. The data recording capability of the device allows the users to generate weekly, monthly and annual reports that help them to be familiar with their previous health status.

The fifth category is intelligent home products, which largely address the control requirements in everyday living for household equipment and furniture [19-20]. Wireless internet or other wireless means to save power and avoid fire incidents, the control of domestic equipment such as a water heater, TV, and air conditioner can be carried out. HD technology can also be employed to monitor the situation at home intelligently; for example, children take care of children within their families, care for elderly people, care for the animals in their families and concern over family ownership by burglars. The intelligent device can be used to take effective preventative actions for all of them. Users can enjoy home life smartly through the usage of clever home gadgets.

Movement monitoring and motion adjustment: Smart, wearable instruments can provide movement parameters to users such as heartbeat, blood pressure and power usage in real time. The modern smart wearable devices are able to monitor user activity parameters and transmit user movement metrics to smart wearable devices in time. Therefore, users may monitor their heart rate, blood pressure, and other statistics at any time during aerobic exercise, such as running, swimming, and cycling. In sports, we can adapt our own sport conditions in accordance with these characteristics so that the players of the sport can alter their state and control their sport at any given time.

VII. CONCLUSION

2015 is known as the first year of smart wearable gadgets with the introduction of Apple's Apple watch. The era of intellectual wearables has come, with far-reaching effects on sports. But there is a relatively short development time for smart wearable appliances and many challenges still have to be overcome, such as resilience, comfort, data collecting and others, which are still a major factor limiting the development of smart wearable gadgets. Smart wearable devices may be precisely combined with them in all fields of sport, and the development of smart wearable equipment can better stimulate sport development, making sport more scientific, more efficient and easily learned. Smart wearable devices have all facets of sports began to permeate. Although the initial stage of development has just begun with intelligent wearable gadgets, every scientific and technological breakthrough requires ongoing testing. The study proposed analyses the status of applications and the outlook of big data in the health management industry. This study presents large data applications on the mental health of football players, monitoring systems and health management systems of chronic diseases that are also good prospects. The Application to various parts of sports work is part of that investigation of an intelligent wearable device. In the future, intelligent wearable devices will therefore have a significant place in the field of sport through the ongoing development of science and technology. Experimental results demonstrate the efficiency of the suggested study.



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