Research on Fitness Exercise Prescription System Based on Intelligent Hardware Equipment

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Abstract: The rapid development of modern information technology has brought unprecedented changes to all walks of life. In the field of sports and fitness, the fitness prescription system is the inevitable result of people's growing desire for healthy life. This paper expounds the basic concepts of intelligent hardware and exercise prescription. By analyzing the application of intelligent hardware devices and the current state of physical fitness, and taking advantage of the advantages of intelligent hardware devices, data sharing and mobilization can be achieved, which helps people to exercise in time and can Feedback fitness situation. Due to the late start of sports and fitness in China, the current exercise prescription system has not solved the problems of standardization, structure and safety. Therefore, the development of a fitness exercise prescription system based on mobile intelligent hardware devices has strong social and practical significance.

1. Introduction

With the continuous improvement of residents' living standards, people are paying more and more attention to their own health problems, so the prescription of fitness exercise has begun to be favored by more and more people[1]. The concept of exercise prescription was first proposed by American physiologist Kapovic in the 1950s. Exercise prescription can improve the national physique, strengthen the body, and at the same time prevent various chronic diseases, use scientific exercise prescriptions for fitness, and can produce the most obvious exercise effect in the shortest time. We know that there are many ways to exercise, such as repeated exercise method, change exercise method, interval exercise method, tour exercise method, game exercise method, aerobic exercise method, exercise prescription exercise method, etc., from the perspective of improving health effects, It can be said that the exercise prescription exercise method is an ideal exercise method. However, sports itself is a "double-edged sword". If the sports you choose are appropriate and the methods and means of exercise are scientific and reasonable, you can achieve the goal of improving health. If you do not follow the scientific method, you will not be able to achieve fitness. The effect will be harmful to the health of the body. In order to achieve the goal of scientific exercise and fitness, it is more important to analyze and study the exercise prescription system.

2. Overview of Smart Hardware and Exercise Prescription

2.1 Intelligent hardware

Intelligent hardware is a converged product and service formed by the combination of information and communication technology and traditional equipment. It is characterized by a new generation of information technology such as intelligent sensing interconnection, human-computer interaction, new display and big data processing, with new designs, new materials, The new technology is a new type of intelligent terminal products and services. Intelligent hardware covers a wide range of fields, including wearable devices, virtual reality devices, service robots, micro drones, health care, smart homes and more.

2.2 Basic concepts and contents of fitness exercise prescription.

The fitness exercise prescription is based on medical examination data for people engaged in

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physical exercise. According to their health, physical strength and cardiovascular function, the appropriate type of exercise, time and frequency are prescribed in the form of prescription, and the precautions in exercise are pointed out. A way for humans to exercise purpose, plan, and science[2].

The purpose of fitness exercise prescription is to develop a physical, physique, and physical and mental health as a main goal, and to develop a scientific and quantitative exercise method for personal characteristics and physical condition. It consists of four elements: a reasonable exercise item. Which sport is the most suiTable for a sport? Reasonable exercise intensity - How big is the intensity of exercise? Reasonable exercise time - How long should each exercise last? The frequency should be exercised for a few days a week? China has also begun to introduce the theory of exercise prescription. The experts and scholars in the sports industry have conducted in-depth research on the theory and practice of fitness exercise, and have achieved remarkable results. The current 12-minute running test As the main goal of strengthening cardiovascular system and respiratory function, fitness exercise prescription is a popular exercise method in recent years and has been widely used in many exercise tests.

2.3 Classification of fitness exercise prescriptions.

Exercise according to exercise prescriptions. Can avoid blindness, randomness, scientific, targeted, practical and safe features, can achieve a good effect. Modern emerging sports prescription requirements include three types of exercise, namely aerobic exercise, stretching exercise and strength exercise, to achieve the best results of comprehensive exercise.

3. The Current situation of physical fitness based on intelligent hardware equipment

3.1 The status quo of physical fitness of intelligent hardware devices

With the development of intelligent hardware device technology, some new terminal devices, smart bracelets, smart watches, and smart running shoes have appeared in the equipment related to sports and fitness. Built-in smart mobile operating system and various sensors in the smart device, can connect with the network and smart phone system to achieve most functions of the smart phone[3]. Through the use of mobile intelligent hardware devices, not only can you get real-time sports information, your own sports and fitness related data, network location, learning various physical exercise methods, but also can watch sports and fitness related videos anytime and anywhere under the premise of network conditions. Communicate with friends who share common sports preferences, actively participate in exercise, and promote physical fitness.

3.2 The impact of intelligent hardware devices on physical fitness

The application of intelligent hardware devices in physical fitness mainly spreads sports fitness information through mobile phone WAP portal; various social software (QQ, Weibo, WeChat, etc.) promotes the communication between people and promotes the dissemination of sports information; Mobile phones spread a variety of fitness-related knowledge and dynamics; sports APP applications provide a more convenient and scientific fitness method for physical fitness, and a variety of mobile fitness APP software is born at the moment; can disseminate various sports and fitness information in a timely manner . The application of laptop in sports and fitness is mainly the spread of sports and fitness information. Like Tablet computers, it belongs to the extension of PC terminal. The application function is lacking, but in terms of portability, no matter in the usual study and life, More convenient than a computer[4]. Notebooks and Tablets are used to disseminate sports and fitness information to people through various sports and fitness websites and videos. Wearable devices use computer technology to embed some of the functions of mobile devices into traditional wearable items, making them more porTable in sports and fitness. Mobile smart hardware device fitness function adds health data, network positioning, social and other functions compared to traditional fitness.

4. Design and Implementation of Fitness Exercise Prescription System Based on Intelligent Hardware Equipment

4.1 Composition of fitness exercise prescription system

The design of the fitness exercise prescription system not only provides convenience for people's fitness, but also ensures the needs of people's physical fitness evaluation and monitoring, and ensures the operability of the software in practical applications[5]. Therefore, in the process of system design (see Figure 1), adhere to the principles of practicality, accuracy, speed, safety, and simplicity, using database and template design methods, including information management module, physical testing module, sports quality The person handling it.

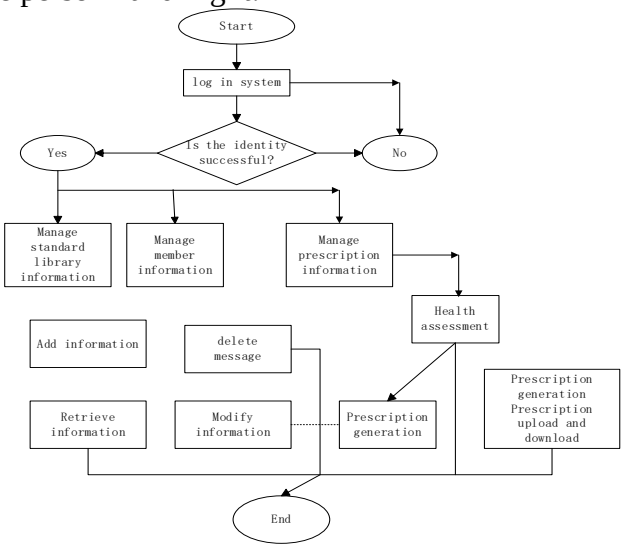

Figure 1. Basic workflow of the exercise prescription system

4.2 Fitness exercise prescription system demand modeling

For the description of exercise prescriptions, we can carry out a series of physiological and biochemical indicators tests, psychological tests, body shape tests, each test contains a variety of specific detailed small tests, each test is a separate Table, and finally passed The health assessment gets the final corresponding exercise prescription. The data flow analysis method in software engineering is a system analysis process based on data stream technology, top-down and step-by-step refinement. Here, the context data flow graph is mainly used to model the motion prescription system (see Figure 2).

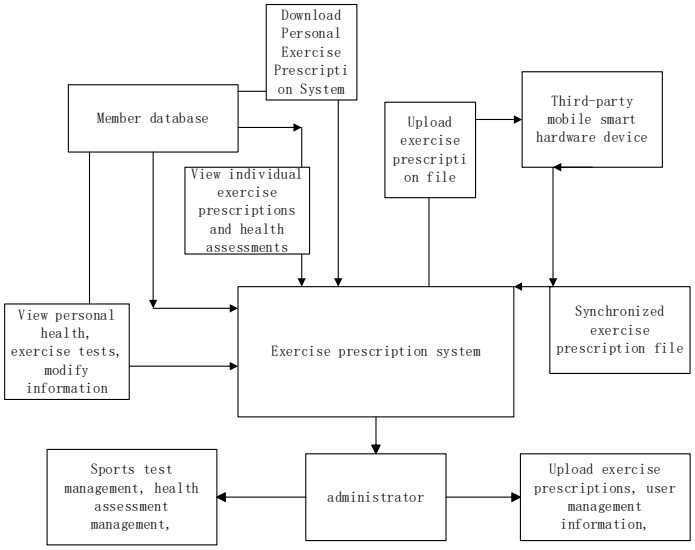

Figure 2. Flow chart of fitness exercise prescription system

4.3 Design and implementation of fitness exercise prescription system

In order to finally realize the target system of the fitness prescription system, all the programs and databases that make up the system must be designed, and then the structure design of the exercise prescription system program and database should be constructed[6]. This work is especially important for some more complicated programs. When designing the software structure, we must first decompose the complex functions from the perspective of implementation, making it a series of relatively simple functions.

Typically, each submodule in the system is responsible for completing a single function. The specific structural level of each module is: the whole system's business is realized by calling its lower-level module top-level module. Each lower module calls the lower module, and the lowest module performs the function of the system to complete the corresponding subfunction of a module. The fitness exercise prescription system should be divided into three layers from top to bottom. The first layer of user rights authentication compares the user login information to determine whether the user has permission to log in. The second layer is the system function module management, which mainly includes membership and standard library management, health assessment management, exercise prescription upload and download. These three modules are the main functions of the exercise prescription system[7]. The third layer includes sub-modules such as member management, standard library management, questionnaire management, sports test management, health assessment, prescription upload and download. For the analysis of business and the modeling of data, a standardized database design pattern is adopted. When you create a database, choose SQLSERVER as the storage structure for the database.SQL Server provides an integrated development environment and more advanced data extraction, enabling developers to create next-generation data applications. At the same time, the access to the data is simplified. Since the system is written by .net technology, through the use of ADO.net for data connection, and the deep customization support of SQLSERVER by .net, the development efficiency can be greatly improved and the development cycle can be reduced. The SQLSERVER storage engine is suiTable for high concurrent reads and writes through support for transactions[8]. Each layer of SQL Server 2005 uses a combination of certificates, asymmetric keys, and symmetric keys to encrypt the layer below it, improving key security, thereby increasing the security of the system database, through data disaster recovery and logging systems. Improve the stability of the database and facilitate regular maintenance of the database. Mainly considering the deep optimization of the database, we choose SQLSERVER as our database, and use ADO.NET technology to complete the interaction between the persistence layer and the data access layer, and use the transaction to ensure the system's multiple concurrent read and write[9]. After converting the logical model of all entities into a physical model, the system obtains a database Table corresponding to the entity and the relational entity according to the relational entity graph. Through these database Tables, the Tables can be actually stored in the database, thereby obtaining the final Data that is physically stored in the database.

4.4 Fitness exercise prescription system test and analysis

Table 1 12-minute running standard maintenance module test

Test case	Test Data	Test Results
Generate the correct 12 minute run standard	Input upper limit Limit, category, sex No and age	12 minutes running standard correctly generated
Generate an incomplete 12-minute run standard	Do not enter the upper limit portion	The dialog asks for an unfilled part
Generate standards that conflict with existing standards	Enter the existing age range	Correctly display the health assessment corresponding to the old test Table
Generate a complete exercise prescription	Generated using a full health assessment	Exercise prescription Table shows complete
Generate incomplete exercise prescriptions	Use incomplete health assessment	Exercise prescription shows the missing part

The health assessment test case is mainly divided into three parts. First, test whether the system

can correctly give the user's health assessment when the other four tests are completed completely[10]. Secondly, when the four tests are only partially completed, Whether the health assessment form is only the evaluation of the corresponding part, and finally whether the test of the different time is selected can obtain the evaluation of the user's previous test. The test is shown in Table 1.

5. Conclusion

With the development of society and economy and the implementation of the national fitness program, the demand for fitness activities is increasing. Through the in-depth analysis of the status quo and problems of the combination of mobile intelligent hardware devices and exercise prescription systems, based on the latest intelligent technology, a mobile exercise prescription system based on intelligent hardware devices is proposed to separate a large amount of user information. The data separation motion prescription is stored in the intelligent hardware device, which is conducive to collecting statistical data, providing the necessary monitoring data (such as pulse, heart rate, heat, etc.) for the wearable device in the future, and interacting with them to study the health of the Chinese people. The situation improves the physical quality of the people.

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