Research on Improving Elderly Health Service System by Computer Artificial Intelligence Technology

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Abstract. This article first analyzes the needs of the elderly, their families, community health service personnel and volunteers. Then this paper innovatively uses computer artificial intelligence technology Microsoft NET platform, Visual Studio 2013 integrated development environment, C# language, MySQL 5.7 database and ASP NETMVC development framework to develop the elderly health service system. The platform designs the framework and system function modules of the elderly health service system based on intelligent mobile products. After the system is completed, it is deployed on the Alibaba Cloud server. Experiments show that the system can meet various information needs of elderly health services accurately, efficiently and timely with the help of computer artificial intelligence technology. The system has the characteristics of information authority and credibility, and content can be customized.

Keywords: computer · artificial intelligence · the elderly · health service system

1 Introduction

According to the data released by the Office of the China Aging Commission, by the end of 2011, the number of elderly people aged 60 and above in China had reached 185 million, accounting for 13.7% of the total population. speed. With the aging of the population, the miniaturization of families, and the increase in the decline of the elderly and the birth rate, the family structure and support function are affected, and finally the pension function is transferred to the society [1]. At the same time, the pension service industry is in full swing under the policy guidance, and more and more enterprises invest in the elderly care service industry, comprehensive and high-quality services make more and more urban elderly choose institutional elderly care. In the context of the rapid development of Internet information technology, the government has put forward guiding

opinions on building a network platform for pension information services. By analyzing the lifestyles of the elderly at different ages, this topic starts to study the design of the elderly health service system based on the mobile intelligent terminal under the old-age care mode from the aspects of material and spiritual needs.

2 Demand Analysis

2.1 Analysis of User Needs at the Level of Physical Function

According to the physical functions of the elderly, their needs are roughly divided into several categories, such as health care and disease prevention, consultation and treatment, post-illness rehabilitation, chronic disease management, and disability care. Healthy and self-care elderly, with relatively good physical and mental conditions, willing to actively monitor and prevent diseases. They not only need regular and comprehensive health examinations, and establish complete electronic health records, but also need channels for health education and disease prevention knowledge, so that they can easily diagnose and treat common diseases and purchase prescription drugs.

Hypertension, diabetes, coronary heart disease and stroke are the chronic diseases with the highest incidence in the elderly population. Chronic diseases last for a long time and have complex etiologies. After the onset is diagnosed or hospitalized, long-term and frequent doctor-patient communication, treatment, medication and psychological counseling are required. In addition to the basic medical care needs, the elderly with these diseases also needs more specialized medical care services. For example, the hypertensive population needs regular blood pressure measurement, risk assessment and tiered management [2]. Diabetic patients need blood glucose monitoring, personalized exercise guidance, and prevention of infectious diseases, complications, and observation of adverse reactions. Stroke patients need professional care and follow-up during rehabilitation treatment, as well as professional limb function training. Patients with coronary heart disease need progressive rehabilitation exercise guidance, long-term standardized treatment plans, and monitoring of drug treatment effects and adverse reactions. The post-illness recovery period of other diseases also often requires rehabilitation counseling, rehabilitation treatment, assistance with exercise, reminders and assistance in taking medicines, and acquisition of rehabilitation knowledge, as well as psychological counseling and construction.

The disabled elderly basically lacks the ability to take care of themselves, their physiological functions decline, and they rely on long-term medical records to varying degrees. Such as long-term bed rest due to paralysis, trauma, deterioration of chronic diseases, etc. Over time, patients are prone to complications such as pressure ulcers, lower extremity deep vein thrombosis, pulmonary infection, and urinary tract infection due to weakened physical activity, decreased immune function, and reduced self-care ability. Therefore, the disabled elderly needs specialized and intelligent medical care to ensure the quality of life as much as possible.

In addition, because the physical functions of the elderly group may be transformed between several states, some elderly people with multiple chronic diseases need a comprehensive and multi-level responsive medical service system.

2.2 Analysis of User Needs at the Level of Other Influencing Factors

The age, family model, and income status of the elderly also affect the needs of elderly users. As the elderly grow older, their mobility, self-care ability, and sense of social participation gradually decline, requiring more comprehensive and convenient medical care and spiritual comfort. For the elderly who are elderly at home and have limited mobility, there is an urgent need for home consultation and corresponding treatment services. However, due to imperfect regulations and unclear division of medical safety responsibilities, professional medical staff in the community do not provide home injections, infusions, catheterization, and intubation. Invasive medical procedures, such as gastric tubes, force the elderly and their families to toss around or call 120 to go to the hospital, and often face no beds [3]. The family model of the elderly is mostly divided into nuclear family, joint family and empty-nest family. The economic income mainly consists of pension, personal savings, child support, medical insurance, etc. The family situation and economic level enable the elderly to obtain support, companionship, there is a huge difference in the level of medical care. Due to the long-term hospitalization of some elderly people, a huge economic burden is brought to the family, resulting in inefficient use of the limited medical resources. Taking care of the elderly at home will not get professional medical care due to the lack of professional accompanying knowledge of family members, and at the same time, it is easy to cause heavy life and work pressure to the family.

3 Design and Implementation of the Elderly Health Service Information Platform

3.1 System Overview

This information service platform is positioned as an online information service platform that provides information service functions such as health management, disease prevention and control knowledge, and patient social interaction to the elderly [4]. The target users of the platform are elderly people over 60 years old who already suffer from one or more chronic diseases or have potential chronic disease prevention needs. The platform adopts a non-profit public welfare operation model as a whole, aiming to assist the elderly to prevent and control their chronic diseases, and to improve the richness and happiness of their elderly life.

3.2 System Function Design

1) Personal Center Module
The main functions of the personal center module include the user's personal login, the storage of the user's personal basic information and the user's health information, and it is the basic module of the entire system.

2) Medication reminder module

The vast majority of elderly patients with chronic diseases need long-term medication, but due to the decline of their own memory, it is inevitable that they will forget to take the medicine on time and in the amount. The medication reminder module will remind patients to take medication on time according to the user's settings, and record their medication details to form a memo.

3) Online medical consultation module

The purpose of the online medical consultation and medication reminder modules is to meet the health management information needs of elderly patients with chronic diseases. When patients have health problems or questions that they cannot solve, they can use this module to consult with professional medical staff, so as to keep abreast of changes in their own health conditions, eliminate inner confusion, and minimize unnecessary offline medical treatment.

4) Knowledge Learning Module

The purpose of the knowledge learning module is to meet the disease prevention and control knowledge needs of elderly patients with chronic diseases [5]. In response to the information overload phenomenon that is common in the current Internet environment, the knowledge learning module has changed from "people looking for information" to "information looking for people". The information related to keywords on the four authoritative and high-quality information sources of Dr. Lilac and the elderly website is pushed to users after filtering advertisements and spam, helping users to obtain the disease prevention knowledge they need, but it is difficult to find online.

5) Patient circle module

The purpose of the patient module is to meet the targeted social information needs of elderly patients with chronic diseases. Users can add patients in this module, discuss with patients on issues such as disease prevention and medical consultation, and exchange experiences [6]. They can also ask questions related to chronic diseases in the patient community, and invite other patients to help to answer them, realizing chronic disease prevention and treatment information resource sharing.

3.3 System Architecture

The research designs the information service system for elderly patients with chronic diseases as a four-layer architecture including application presentation layer, business logic layer, data access layer and data resource layer. The overall system architecture is shown in Fig. 1 (the picture is quoted from A system that our super-aged society needs).

1) Application Presentation Layer

The application presentation layer is the top layer of the system structure and directly interacts with the user. In order to facilitate elderly patients with chronic diseases with different usage habits, the system can be accessed in three ways: web terminal, mobile app and WeChat applet [7]. Among them, the WeChat applet relies on the WeChat client, and can log in through WeChat authorization without additional registration, and can be
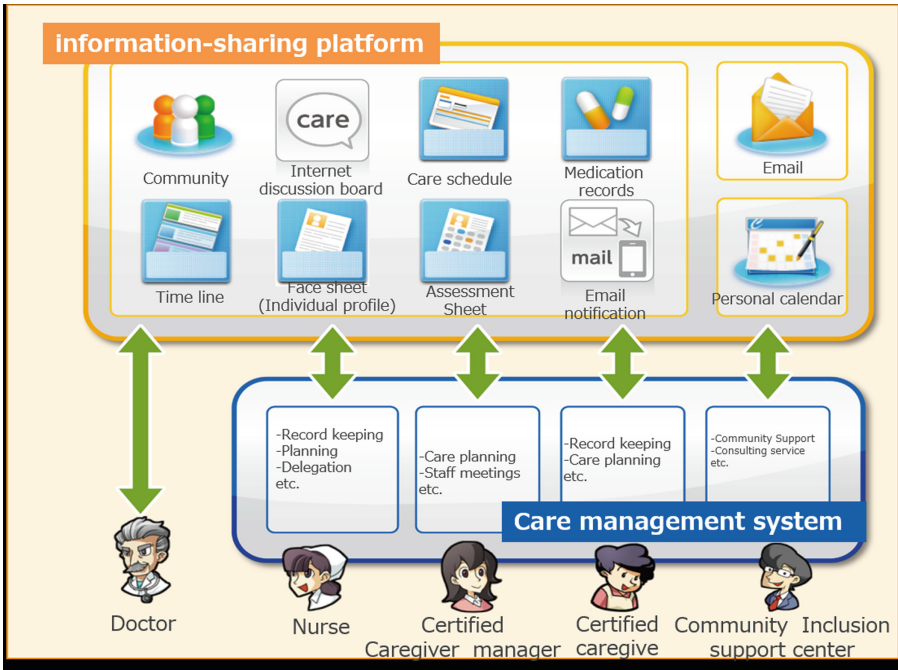
Fig. 1. Elderly Health Information Service System

directly entered through the desktop portal after setting, and can realize the sharing of reading content in the fastest way, which can effectively reduce the elderly The cost of use will therefore be regarded as the focus of system operation.

2) Business Logic Layer
The business logic layer is also called the domain layer or the application layer, including all the business or work related to the domain in the system. In this system, the businesses that users participate in include identity authorization/login, online medical consultation, medication reminders, knowledge learning, and socializing with patients. Data communication between modules follows the principles of high cohesion and low coupling.

3) Data Access Layer
The data access layer is mainly responsible for data persistence operations, that is, on the one hand, the data of the data resource layer is fed back to the business logic layer, and on the other hand, the data newly generated by the business logic layer is stored in the data resource layer [8]. In this system, the data operation of the data access layer mainly includes data collection and data analysis.

4) Data resource layer
The data resource layer contains the data of each module of the system. In this system, the data resource layer is mainly composed of four databases: personal basic information

Fig. 2. Design of Health Data Collection Form

database, medication reminder database, disease prevention knowledge database, and patient community database.

4 Database Design

4.1 Alibaba Cloud's MySql5.7 Database

Alibaba's many years of optimization and accumulation in e-commerce applications such as Taobao, its performance, scalability, and stability have excellent guarantees. MySQL is a relational database management system, relational database keeps data in different tables instead of keeping all data in one big warehouse, which increases speed and improves flexibility. MySQL version 5.7 provides native JSON support, which is very suitable for RESTful design and development in combination with ASP.NETMVC.

4.2 Structure Design of Health Data Collection Table

The device is tested by supporting 32 kinds of health data, and we have selected 18 commonly used indicators for monitoring. Since the device supports Socket mode to upload JSON data to a server with a specified IP, we use JSON format for storage when designing the database, which is convenient and effective. The specific data table field design is shown in Fig. 2 (the picture is quoted from Identifying Points of Interest for Elderly in Singapore through Mobile Crowdsensing).

4.3 Structural Design of Positioning Data Collection Table

The device positioning method is GPS positioning and supports Wi-Fi positioning and base station positioning. Through programming development, we set the device to report
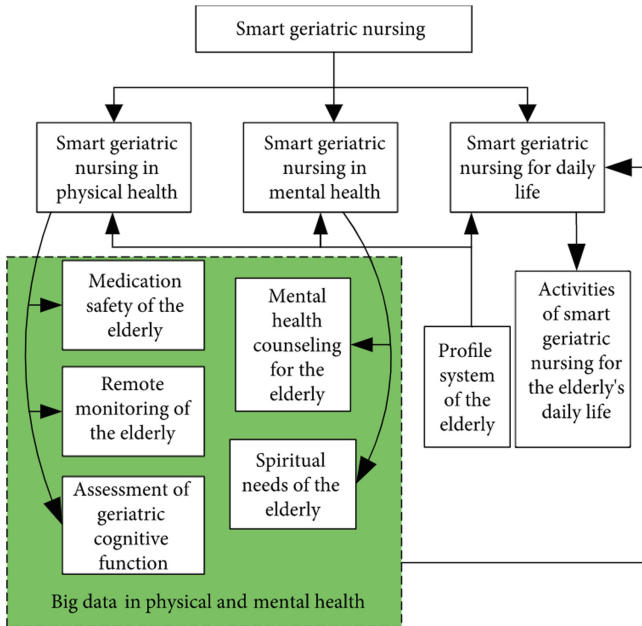
Fig. 3. Design of positioning data collection table

positioning data every minute and automatically collect the user's geographic location information. The specific data field design is shown in Fig. 3 (the picture is quoted from A Simple Framework of Smart Geriatric Nursing considering Health Big Data and User Profile).

4.4   Structure Design of Volunteer Activity Table

Volunteer activities are mainly for the convenience of the elderly and the community. We invite more than 20,000 students from the college as volunteers. Through the WeChat mobile platform, we invite volunteers to participate in each activity before the start of each activity; before departure, volunteers need to use mobile phones to sign in; During the activity, volunteers can use their mobile phones to take pictures and record the content of the activity; after the activity, volunteers use their mobile phones to write activity experiences and upload activity photos, which will be identified and reviewed by the instructors related to the activity, and finally given credits for the volunteer activities. At present, the activity involves community college activities, youth league committee activities and academic-work activities, covering almost all the volunteer services of the college.

5 Process and Interface Design of the Elderly Health Service System

The elderly health service system client can be installed on Apple iOS and Google Android operating systems, and the mobile phone can be accessed through WIFI or 5G. Elderly people and their children's family members can share account information, detect and adjust service needs, and monitor health indicators in real time. The specific operation process is shown in Fig. 4 (the picture is quoted from An Elderly Care System Based on Multiple Information Fusion).

The user opens the health service system APP, enters the registration interface, and enters the basic information of the elderly, including basic information such as age, gender, income, educational level, family structure and number, and address. After confirming the information and submitting it, enter the login interface, set the user's name and password, and prompt to save the password with a prominent font to ensure automatic login later and simplify the operation. Entering the main interface, users can directly input recent health data, including weight, height, sleep status, common diseases, genetic medical history, heart rate, blood pressure and other recent physical indicators, and establish a health data file. The system platform pushes feedback information to users according to user information analysis and demand matching analysis. Provide personalized service module and personalized service recommendation module. The user can choose the personalized service module independently or choose the personalized service module recommended by the system. Provide differentiated products and services for the elderly.

The system sets up message reminders for health data updates, and as users regularly update their personal health data, the system platform also updates tailored health services. Page style customization. The system provides default pages and other pages to be selected, and users can set them according to their own style and hobbies, reflecting the concept of people-oriented service. The health service system for the elderly is generally multi-level and diversified.
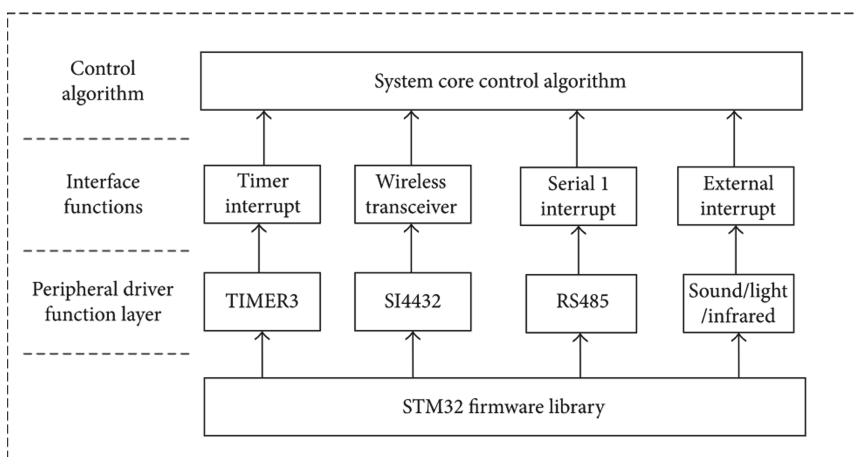

Fig. 4. Interface flow of the elderly health service system

6   Conclusion

According to the medical and elderly care needs of the elderly, this paper puts forward strategies and suggestions such as the collaborative, diversified and precise design of the service system, the mobile and automated design of the service process, the aging-friendly design of the intelligent terminal, and the humanized design of the service environment. Community home-based smart medical care and elderly care services that promote medical care and support medical care.

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