

Research and Application of Community Pension Service Data Analysis System Based on Data Mining Algorithm

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Abstract: In recent years, with the development of China's aging population, pension issue has become a major issue related to the national economy and people's livelihood continues to be concerned. This paper aims to study the design and implementation of data analysis system of community elderly care service based on data mining algorithm. Firstly, this paper introduces the theory of data mining, and designs three modules of community pension service. Secondly, the gender, age, education level, the number of people living with the elderly and the situation of chronic diseases are used as variables for model design, and finally a community service pension system is designed in accordance with the national conditions. The experimental results of this paper show that, on the basis of data mining algorithm, the construction of community pension service system satisfies the needs of the elderly, among which, the highest reaches 91.8%, which also shows that the pension service system brings great convenience to the elderly.

Keywords: Data mining algorithms, community pension services, data analysis systems

I. INTRODUCTION

With the development of the information age, data mining applications are very extensive, including a variety of technologies, of which classification technology is currently one of the most critical technologies in data mining [1]. Classification is mainly to establish a classification model based on sample data sets to predict the development trend of a large number of data sources. Due to the importance of classification technology, it has attracted widespread attention from the scientific and industrial circles [2-3]. This paper mainly implements an intelligent data analysis platform that analyzes and processes data under the big data platform, cluster deployment and management, and data migration, thereby assisting decision-making [4]. The realization of data mining algorithms under the big data platform is of great significance for realizing business model-based big data construction and big data service applications [5].

With the development of society and the advancement of technology, more and more researchers have devoted themselves to the research of data mining algorithms [6-7]. Among them, it usually takes a long time to build a machine learning model, but none of the existing machine learning software can provide an important progress indicator [8]. Similarly, running data mining algorithms usually takes a long time, but none of the existing data mining software provides important progress indicators. Gang L considers the problem of providing progress indicators for the construction of machine learning models and the execution of data mining algorithms [9]. He discussed the inherent goals and challenges of this issue. He then described the initial framework for implementing such progress indicators and their

two high-level potential uses, with the goal of stimulating future research on the subject [10]. His research direction is very in line with current needs, but it is still obviously insufficient in terms of practicality.

The innovation of this paper is (1) analyzes the current aging society. With the intensification of aging, the growth rate of the elderly and the empty-nest elderly are also accelerating, and the necessity of building a smart community elderly care service system is analyzed. (2) When conducting statistical analysis on the demand for community elderly care services, cross-link the influencing factors and the demand for various specific services to analyze the difference in demand.

II. COMMUNITY ELDERLY CARE SERVICE METHOD BASED ON DATA MINING ALGORITHM

A. Data Mining Algorithm

Data mining, also known as knowledge discovery, refers to intelligently searching for valuable information hidden in large amounts of imperfect, noisy, fuzzy and random data.

The role of data mining is to discover or extract potentially useful information from a large amount of data. The development process can be divided into five stages. The first stage is based on an independent system, using vector data, and only supports one algorithm. The second stage is to combine data mining with databases and support multiple algorithms at the same time. The third stage of data mining is based on a grid-based calculation method. At the same time, the prediction model is integrated into the data mining process, which can process Web data and semi-structured data. The fourth stage is distributed data mining, which is a way of

distributing multiple algorithms for execution on multiple nodes. The fifth stage is data mining based on cloud computing, which uses a distributed parallel processing and service model. The same algorithm can be distributed on multiple nodes, and multiple algorithms can also be executed in parallel. The computing resource structure of multiple nodes will be centralized to form a shared resource pool, and tasks will be allocated on demand.

B. Data Mining K-means Algorithm

The K-means algorithm is a partition-based algorithm, and it is also one of the most widely used algorithms in clustering algorithms. Its basic idea is: give the value of K in advance, and then randomly select K points from the original data set as the initial cluster center. Then calculate the distance between it and all cluster centers for each point in the data set, and assign it to the cluster represented by the nearest cluster center. Finally, when all the points are divided, the center of the class is updated and a new round of iterative operation is performed. Repeat the iteration process as described above until the cluster centers converge or meet other conditions (usually the maximum number of iterations).

In the description of the K-means algorithm flow, when all the points in the data set are assigned, the center of the cluster is updated, and the new cluster center is finally obtained as:

$$c_j^* = \frac{1}{N_j} \sum_{u_m \in c_j} u_m, 1 \leq j \leq K \quad (1)$$

The process of assigning points and updating cluster centers is repeated until the objective function converges, that is, the center point no longer changes, or the maximum number of iterations is reached.

C. Community Elderly Care Services

The so-called community elderly care refers to "the government and social forces rely on the local society to provide living care, housekeeping services, rehabilitation care, and mentally comfortable service forms for the elderly at home." The content should include lifelong care services, medical services, emotional services, cultural and entertainment services, and services for the elderly. Communities establish day care centers for the elderly, set up community health service centers, and open elderly activity centers to provide elderly care services.

The community elderly care service system conforms to my country's national conditions and is an extension of other elderly care models within the framework of the social system. The safety of the elderly is the foundation, and secondly, it is necessary to take the age management of the community as a core, based on the institutions that provide various age services, and take care of the elderly at home as

the goal. It is provided by volunteers. The basic value of free services is for the elderly in the whole society, so that the elderly can enjoy a full range of elderly care services, protect the personal safety and health of the elderly, and enrich the lives of the elderly on the other hand. The system design is mainly divided into three modules, namely information management module, elderly service module, community announcement and health express module. The system structure diagram is shown in Figure 1:



Figure 1. Community elderly care service system framework

III. EXPERIMENTAL DESIGN OF COMMUNITY ELDERLY SERVICE

A. Model Design

In the following, five factors including gender, age, education level, number of people living together, and prevalence of chronic diseases are used as independent variables. Assign values to variables and establish a Logistic regression model to analyze the factors affecting the demand for community care services.

The logistic regression model is:

$$\text{logit}(n) = b_0 + b_1x_1 + b_2x_2 + \dots + b_nx_n + u \quad (2)$$

Among them, n is the probability of the dependent variable, x_1, x_2, \dots, x_p is the explanatory variable, b is the coefficient, and u is the random disturbance term. Gender, age, educational level, number of people living with chronic diseases are assigned values according to the data situation and research needs, as independent variables, and the needs of life care services, medical care services, and leisure and social services are separately assigned.

B. Construction of An Evaluation Index System for the Quality of Community Elderly Care Services

Community services for the elderly are divided into four types of resource services: daily care, medical care, rehabilitation, and spiritual culture. Each resource has its own characteristics, and the quality evaluation index of each resource is also different. For example, daily services focus on concentration, entertainment, and other pleasures. Daily core life indicators, medical services pay more attention to medical equipment, doctor qualifications, etc. In view of the different service resources of the elderly community, it is

necessary to establish the corresponding quality of the elderly community service.

The construction of the community elderly care service quality index system is divided into three steps: the selection of evaluation indexes, the determination of index assessment standards, and the calculation of index weights. First of all, according to the objective, independent, scientific, and comprehensive indicator selection principle, through questionnaire surveys, the needs of the elderly in social life are taken as the starting point, as the service elements of the elderly service providers; the service process and the elderly services is the starting point, as well as the feelings and expectations of the elderly about the service. Secondly, the quality evaluation indicators of community care services, rules and regulations, and relevant laws and regulations, clauses and documents of the indicator content are used to determine the standards of the evaluation indicators; and according to the analytic hierarchy process, the indicators for evaluating various resources of community nursing services, calculating matrices, and calculating The average feature weight of each index in the evaluation table, check the consistency of the evaluation table, and constantly change the weight value of each index according to the consistency result, until the weight meets the requirements.

IV. COMMUNITY ELDERLY CARE SERVICE SYSTEM BASED ON DATA MINING ALGORITHM

A. Current Status of Community Elderly Care Services

Community elderly care services have developed against the background of the social elderly dependency ratio increasing year by year and the introduction of relevant policies. In recent years, community service agencies have increased year by year and community elderly care services have been developed, providing favorable conditions for the improvement of community elderly care services.

According to statistics released by the National Bureau of Statistics in 2019, from 2010 to 2019, the number of people over 65 increased from 100.24 million to 138.24 million, an increase of 38 million in 10 years. The ratio of the population aged 65 or older to the total population increased from 7.52 percent in 2010 to 9.83 percent in 2019, and the ratio of elderly dependants increased from 10.32 percent in 2010 to 13.75 percent in 2019.

The old-age dependency ratio is "an important indicator for judging the economic burden of the elderly population on society and

measuring the economic burden of laborers. It reflects the impact of the elderly population on social and economic development. The elderly dependency ratio in 2019 is shown in Figure 2:

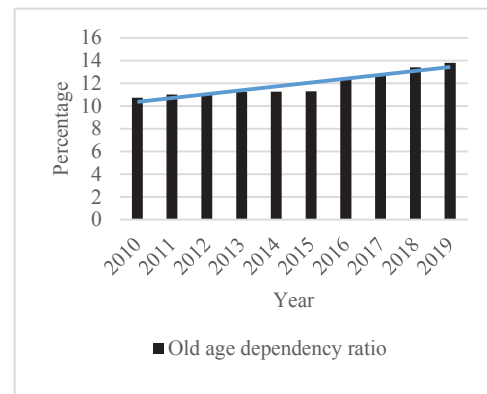


Figure 2. Proportion of elderly support from 2010 to 2019

From the data in the figure, it can be seen that from 2010 to 2019, my country's old-age dependency ratio has increased year by year, and the old-age dependency ratio has increased year by year, indicating that the society's support burden on the elderly has increased. It shows that my country has already entered an aging society, and the degree of aging is deepening. The deepening of the aging degree will put pressure on my country's economic operation and social stability. The improvement of elderly care services is imminent. Community elderly care services are an important part of elderly care services. It provides the elderly in the community with pension insurance including life care, medical care, and leisure and social life. When improving community elderly care services, in addition to relying on national power, social forces can also be fully mobilized to participate in the construction and provision of community elderly care services, relieve social pension pressure.

B. Overall Demand for Community Elderly Care Services

Community elderly care services in this article include life care services, medical care services and leisure social services. The overall demand analysis of community elderly care services is the frequency statistics and comparison of the overall demand for these three types of services.

Table 1. Demand for community elderly care services

Service type	Frequency	Proportion (%)
Life care	435	77.1
Medical care	260	46.1
Casual social	518	91.8

It can be seen from Table 1 that among the 564 interviewees, leisure and social services have

the largest number of choices and the highest demand. There are 518 people in need, reaching 91.8%, followed by life care services, reaching 77.1%, and lastly medical care services. Accounting for 46.1%, shows that the elderly pay more attention to the satisfaction of leisure life needs, while participating in leisure social activities, improve life satisfaction and meet social needs.

V. CONCLUSIONS

On the basis of survey data, this paper selected the 564 research samples, analyses the sample characteristics, building form statistics to calculate the community endowment service demand, and community endowment service can be divided into life care services, health care and leisure social services three categories, through data mining algorithm of three types of service demand influence factors were analyzed. The construction and improvement of community pension service is an effective and necessary measure to deal with the aging of population. The analysis and research on the demand for community pension service provides a basis for providing targeted community pension service, which is conducive to improving the quality and efficiency of community pension service.

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