Intelligent Nursing System for the Elderly Based on Big Data

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ABSTRACT

The current problem of providing for the aged in China is extremely serious. As a weak member of society, the basic right of the elderly is the harmonious and stable development of society, especially in China, where the problem of aging is extremely severe, and the general pension institutions cannot fully and meticulously meet the precise needs of different elderly people. Therefore, this paper mainly studies the intelligent nursing system for the elderly based on big data, aiming to meet the requirements of the elderly of different ages for the elderly through the combination of big data and old-age care. This old-age care model is based on the usual application environment, the internet "big data" as the foundation, accurately applying intelligent technology to provide nursing services for the elderly, and providing interconnected, intelligent, convenient, and efficient old-age care services for the elderly, thus building a real-time, safe, convenient, and low-cost old-age care mechanism.

KEYWORDS

Aging, Big Data, Elderly Care, Intelligent Nursing System

China has transitioned into an aging stage, prompting increased study into topics like elderly care. However, some regions face challenges, notably the elevated average age of elderly caregivers combined with suboptimal quality and skill levels. This issue may stem from various factors, including the unattractiveness of the profession, limited access to training and educational resources, lack of social awareness surrounding elderly care, and burdens related to workload and stress (Li & Tang, 2020).

Developments in computer technology and the evolution of deep learning theory have contributed to the advancement of artificial intelligence (AI; Zhang & Wang, 2021). The integration of big data with these technologies has occurred in many fields, including industry, agriculture, services, and medicine, improving production efficiency and reducing labor costs (Wu, 2022).

By collecting user information from electronic products, databases can obtain real and valuable data. Using scientific research methods, probability theory, and mathematical statistics, this information not only improves convenience but also generates significant economic benefits to people's lives (Pramanik et al., 2017). This method is applied to the field of elderly care, solving some prevalent issues and presenting practical ways to realize intelligent elderly care (Rubeis, 2020). As

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society undergoes accelerated aging, the elderly population's size and proportion are growing, posing new challenges to social, economic, and healthcare systems. To better respond to the increasing needs of the elderly population, this study is dedicated to exploring a big data-based intelligent care system for the elderly. To provide a visual and comprehensive view on the elderly population's structure and trends, a chart on geriatric demographics and projections is included. This visualization underscores the urgency and value of this study, providing a solid foundation for subsequent research.

The statistics and forecasts for the population aged 65 and above in China from 2000 to 2035 are shown in Figure 1.

The aim of this comprehensive study is to explore the application of big data in a geriatric intelligent care system to address the challenges posed by social aging. With advancements in socio-economic conditions and technologies, human life expectancy has increased, intensifying the prominence of aging-related issues. The use of a big data-based intelligent care system for the elderly is considered an innovative solution to problems faced by the traditional aging model. This research will focus on the development of big data in the field of intelligent elderly care, exploring its potential to optimize the elderly care mechanism for enhanced care of the needs of the elderly. By analyzing the impact of big data in terms of caregivers' work stress, work efficiency, and quality of patient care, this study aims to propose feasible recommendations to promote the optimal application of big data in the field of aging.

Intelligent care systems show clear advantages over traditional models. Real-time monitoring, telemedicine, personalized care plans, and other functions improve the effectiveness of elderly care. Intelligent systems, through social interaction and emergency response, can meet the needs of the elderly more comprehensively. In addition, the application of intelligent care systems is not only expected to improve the quality of life for the elderly but also effectively reduce medical costs. This innovative model provides strong support for the future of elderly care, offering a viable solution to the challenges posed by an aging society.

Figure 1. Statistics and forecast of population aged 65 and above in China from 2000 to 2035
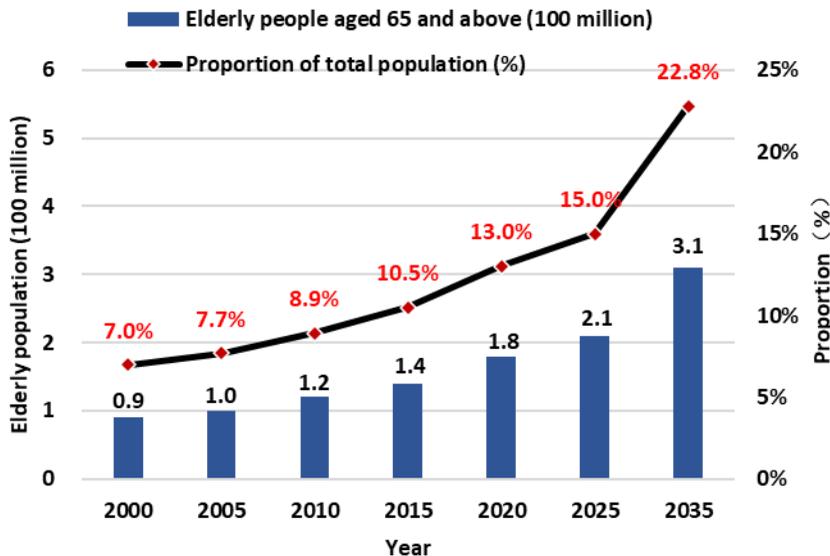
STATUS QUO OF TRADITIONAL ELDERLY CARE

Related Work

Tseng et al. (2013) developed an intelligent health monitoring system tailored for elderly individuals with low information literacy living in the nursing home. The system employs clinical and medical knowledge to monitor the health status of the elderly, featuring a user-friendly interface and automatic feedback to caregivers (Tseng et al., 2013). In the big data era, efficient information technology infrastructures are necessary to support real-time applications. Heilig et al. (2015) introduced a novel approach that applies scalable and cost-efficient cloud infrastructures based on model predictive control structures in intelligent transport systems. Jiang et al. (2016) presented a big data solution employing wearable sensors for continuous monitoring of the elderly. The system alerts caregivers when necessary, forwarding pertinent information to a big data system for analysis. Jin et al. (2016) proposed a human-centric framework, Ubi-Liven, for the safe and secure integration of cyber-enabled ubiquitous holistic living support systems with physical living environments. They further addressed design and technical issues, utilizing cloud, the internet of things (IoT), and big data analytics to provide holistic support for the elderly's activities and healthcare.

Zeyu et al. (2017) focused on analyzing the feasibility of model studies based on noisy trajectory data collected by cell phone for intelligent transportation systems (ITS). Lee et al. (2019) developed an intelligent tool condition monitoring system for smart manufacturing, identifying sustainability-related manufacturing tradeoffs and optimal machining conditions. Marinakis et al. (2020) proposed a high-level architecture of a big data platform for smart energy services, supporting energy managers and city authorities.

Kaffash et al. (2021) provided a a comprehensive review of applications and recognized models using big data in the context of ITS. Zeng and Liang (2022) developed a

smart nursing system for the elderly, demonstrating accurate identification of their living situations at home through algorithmic simulation tests. Wang and Hsu (2023) explored intelligent healthcare systems integrating healthcare with long-term care institutions, providing comprehensive communication and home exposure reports, and the involvement of rehabilitation specialists and other experts. The integrated intelligent long-term care service management system focuses on building a personalized care service system for the elderly, encompassing health, nutrition, diet, and health education aspects.

Development Status

Traditional care for the elderly refers to providing care services for the elderly in old-age care institutions or within families. With the increasing trend of an aging population, there is a growing demand for traditional elderly care (Wang & Xu, 2021). An investigation reveals the current status of traditional elderly care, characterized by the following phenomena:

1. **Population Growth:** The growing aging population has led to an increase in the number of old-age care institutions. At present, there are more than 300,000 such institutions in China. Figure 2 illustrates the number and growth rate of old-age care institutions in China from 2013 to 2021.
2. **Service Level:** The service level is consistently improving to meet the high-quality needs of the elderly. Old- age care institutions are enhancing their service quality by providing comprehensive services, such as medical treatment, rehabilitation, nutrition, culture, and entertainment.
3. **Staffing:** Due to the increasing number of elderly individuals, a common problem is the shortage of nursing staff for the elderly. At present, the average age of nursing staff for the elderly is relatively high, and their quality and skill levels are not satisfactory (Firouzi et al., 2018).
4. **Advanced Equipment:** Nursing equipment and technology are continually being updated. With the ongoing development of medical and nursing technology, there is a constant update

Figure 2. Number and growth rate of elderly care institutions in China from 2013 to 2021
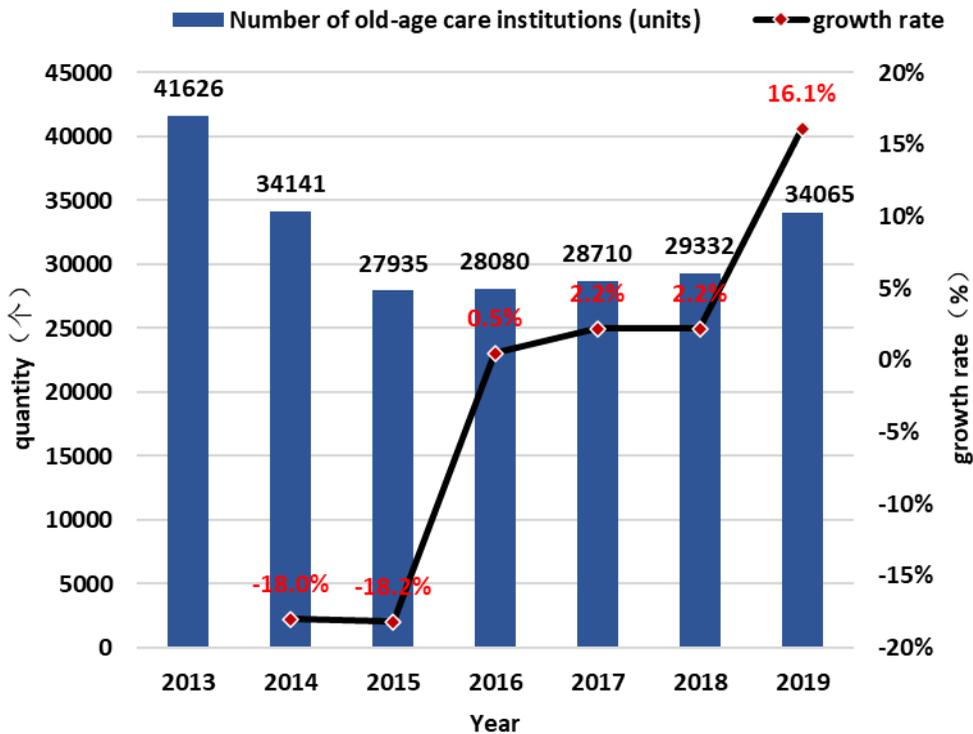

in nursing equipment and technology for the elderly (Lian, 2022). For example, intelligent and digital nursing equipment for the elderly has attracted increasing attention.

5. **Family-Based Care:** With societal progress and improved living standards, more families recognize the value of elderly care and begin to attach importance to family-based care for the elderly. Some communities and local governments are also actively promoting the development of family care services, offering nursing skills training and service support for the elderly (Wei & Hu, 2019). The number of elderly people who need home care services in China from 2000 to 2050 and its forecast are shown in Figure 3.

6. **Technology:** With the ongoing advancement of technology, big data, IoT, and other technologies are being applied in the field of elderly care. These new technologies, such as intelligent beds, intelligent walkers, and monitoring equipment for vital signs, can enhance the elderly's daily care, improving the efficiency and quality of elderly care services.

7. **Diversification of Services:** Traditional care services for the elderly have focused on nursing; however, with the increasing demand for diversified services for the elderly, these services are evolving in a diversified direction. Additional services like tourism, fitness, culture, and entertainment for the elderly are also receiving more attention (Hu et al., 2020; Ma et al., 2016).

Despite facing challenges, the development of traditional nursing services for the elderly is improving. As society continues to advance, elderly care services will become more diversified, personalized, and intelligent, ensuring improved service and care for the elderly (Baldominos et al., 2018).

Figure 3. Number of elderly individuals who need home care services in China from 2000 to 2050 and its forecast
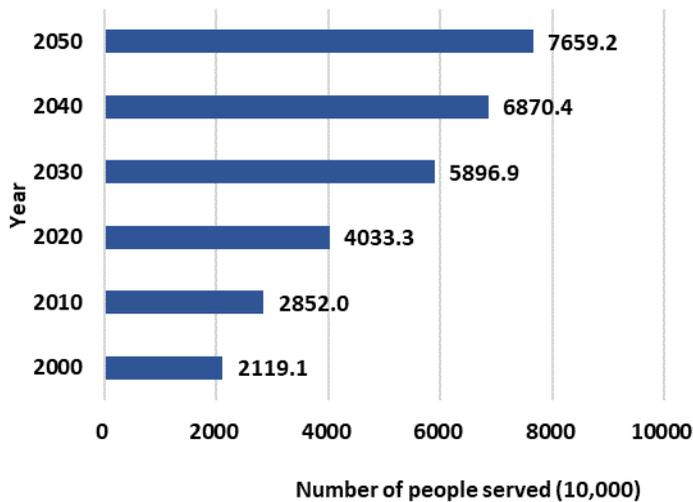
Traditional Nursing for the Elderly

There are four types of traditional nursing models for the elderly:

1. **Institutional Care:** Institutional care for the elderly involves providing continuous accommodation, catering, medical care, nursing, and other services in old-age care institutions (Zhang et al., 2022). This model is suitable for elderly individuals who need a high degree of care or those who cannot receive adequate care within their families (Zeng & Liang, 2022). The advantage of institutional nursing for the elderly is a high standard of care and enhanced safety. However, the disadvantage is a lack of family care and high costs.
2. **Family-Based Care:** Family-based care for the elderly refers to delivering daily care, support, and nurturing services for the elderly within their homes. This model is suitable for elderly individuals in good health who need mild care and attention. The advantages of family-based care for the elderly include strong emotional connections and lower costs. The disadvantages include a limited nursing level and potential caregiver fatigue.
3. **Community-Based Care:** Community-based care for the elderly involves providing day care, rehabilitation services, cultural entertainment, and other support for the elderly within the community. This model is suitable for elderly individuals in good health who need mild care and attention. The advantages of community-based nursing for the elderly include rich nursing services and a positive living atmosphere. The disadvantages include a shortage of nursing staff and fluctuations in service quality.
4. **Online Care:** Online care for the elderly refers to providing services like remote care and health consultations through technologies like the internet and mobile terminals. This model is suitable for elderly individuals in good health who need mild care and attention (Syed et al., 2019). The advantages of online nursing for the elderly include convenience and a wide service range. However, the disadvantages include the need to improve nursing quality and limitations in real-time, on-site nursing performance (Hassan et al., 2019).

In conclusion, there are various traditional nursing modes for the elderly. It is necessary to choose the appropriate nursing mode according to the specific circumstances, family conditions, economic ability, and other factors affecting the elderly (Flores-Martin et al., 2021).

Development Dilemma of Traditional Elderly Care

There are several difficulties in the development of traditional elderly care:

1. **Shortage of Human Resources:** Traditional elderly care relies on professional caregivers. However, the increase in the ageing population has escalated the demand for care, resulting in a shortage of human resources. This situation can lead to heightened work pressure on caregivers and a decline in service quality.
2. **High Cost:** Traditional care often requires the employment of professional caregivers and the provision of care equipment and premises, incurring significant costs. Economically disadvantaged households or regions may face financial pressures in delivering high-quality traditional care for elderly individuals.
3. **Nontransparent Information:** In traditional elderly care, information transfer usually relies on verbal communication by caregivers or paper records, leading to issues of untimely and inaccurate information transfer. This can adversely affect health management and medical decision-making for older adults.
4. **Lack of Personalized Services:** Traditional care often uses a standard set of service processes, making it difficult to meet the individualized needs of different older adults. The lack of personalized services may result in older adults feeling unappreciated and less satisfied in their care.
5. **Inadequate Emergency Response:** Traditional care may not respond promptly in emergency situations, especially when older adults live alone. This delayed response could result in emergencies not being addressed in a timely manner.
6. **Inadequate Quality of Life:** Traditional care focuses on fulfilling basic life needs, such as diet and daily living, but often neglects the social and recreational needs of older individuals, which impacts their overall quality of life.
7. **Lack of Scientific and Technological Support:** Traditional care often overlooks the use of modern scientific and technological means, such as intelligent monitoring and telemedicine, which could improve the efficiency of care and the quality of life for the elderly.

In conclusion, traditional nursing care for the elderly encounters difficulties like a shortage of talent, inconsistent quality, high costs, limited innovation, and inadequate social cognition. Addressing these problems requires collaborative efforts from the government, social organizations, and enterprises to promote innovation and development in elderly nursing services.

INTELLIGENT NURSING SYSTEM FOR THE ELDERLY BASED ON BIG DATA

Theoretical Concepts

The term "big data" was coined in 1956 to describe the utilization of computer technology in simulating the operational mechanisms of the human brain. This involves applying computers to functions like sensory perception, language recognition, and specialized language processing. The objective is to simulate and expand processes related to human brain operations, knowledge acquisition, and knowledge storage (Zhao et al., 2021). AI, rooted in big data, constitutes a multidisciplinary field encompassing diverse knowledge and technologies. Its primary aim is to enable machines to undertake tasks deemed complex by humans (Zhu et al., 2019).

In recent years, big data has found successful applications in disease detection, intelligent diagnosis and treatment, and image recognition. Ongoing research and development in big data extend to fields like intelligent nursing robots, remote health management, and disease intervention (Cui et al., 2020). The clinical implementation of big data not only significantly alleviates the shortage of

medical manpower and resources but also effectively enhances the quality of clinical diagnosis and treatment (Capraro, 2016).

China, as an advanced country, strongly supports the advancement of intelligent nursing. The "Internet Plus Nursing Service Pilot Work Plan," issued by the National Health and Wellness Committee, emphasizes the provision of nursing services for the elderly, disabled individuals, convalescent patients, and those with mobility challenges. The focus is on chronic disease management, rehabilitation nursing, special care, health education, and hospice care (Wen et al., 2021).

Therefore, the intelligent nursing system for the elderly is a system that provides better nursing and caring services by using big data technology and AI (Wu et al., 2017). It can monitor, analyze, and predict the daily activities of the elderly, offering personalized nursing and health advice according to their health status and needs.

Factors Contributing to Widespread Use

First, with the acceleration of an aging population, the elderly demographic is experiencing rapid growth. Consequently, the health and quality of life of the elderly have become common concerns in society (Yang et al., 2022). Therefore, there is a widespread demand for the intelligent nursing system for the elderly based on big data. The scale and growth rate of the internet care market in China from 2015 to 2022 are shown in Figure 4.

Furthermore, as science and technology continue to advance, the application of big data technology becomes increasingly widespread. Big data has the capability to collect, process, analyze, and utilize diverse information, offering valuable technical support for elderly care. The ongoing progress in big data, IoT, cloud computing, and related technologies further expands the application possibilities for intelligent care systems for the elderly based on big data.

An intelligent nursing system founded on big data can enhance nursing efficiency, reduce costs, alleviate the workload of nursing staff, and improve overall effectiveness. Such a system assists nurses in more effectively managing health data and disease information for the elderly, enabling precise prevention and treatment measures that enhance the quality of care. Simultaneously, the intelligent

Figure 4. Scale and growth rate of internet care market in China from 2015 to 2022
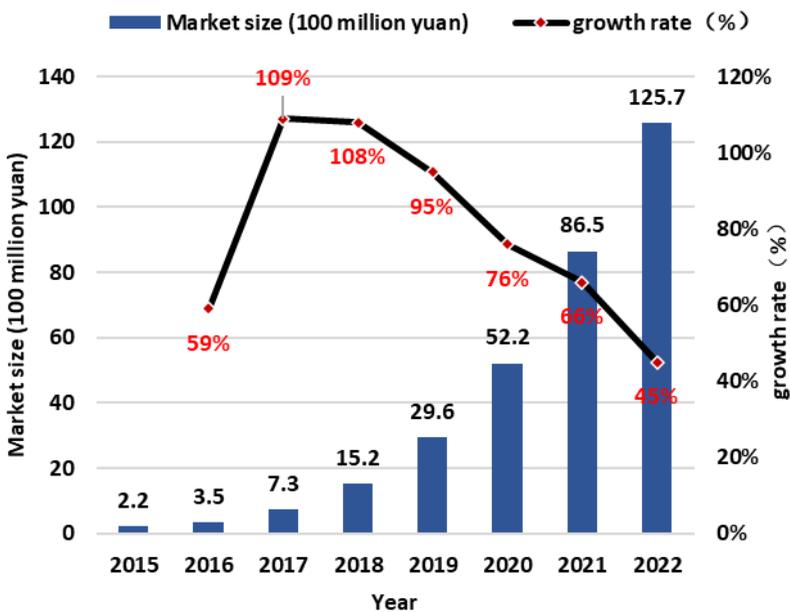
nursing system facilitates personalized and tailored services to cater to the unique needs of elderly individuals.

In conclusion, the intelligent nursing system for the elderly, grounded in big data, holds significant promise and can provide robust support and assurance for health management and elderly care services.

Significance and Influence

The intelligent nursing system based on big data can promote the advancement of the old-age care industry, facilitating the transformation from traditional nursing to a more comprehensive nursing and medical approach. This transition aims to improve the old-age service system, enhance the quality and standard of elderly care services, and meet the diverse needs of the elderly.

The use of big data within the intelligent nursing system can promote social innovation. This system requires the integration of technologies and resources from many fields, fostering collaboration among professionals and encouraging cross-disciplinary exchanges. Such collaborative efforts can stimulate social innovation and contribute to advancements in diverse areas.

The evolution of the intelligent nursing system relies on the support of related technologies, equipment, services and other services. This relationship not only promotes growth of related industries but also creates new opportunities and business models. Figure 5 shows the market size and forecast of China's pension industry from 2018 to 2023.

The intelligent nursing system empowers the elderly, encouraging active participation in their health management and nursing services. This improved sense of participation and autonomy allows the elderly to choose their service content and methods according to their preferences, achieving a customized experience.

The intelligent nursing system, rooted in big data, can promote the development of home care. By offering services like remote monitoring, medical consultation, and emergency rescue, this system provides comprehensive and convenient support for family nursing, contributing to the advancement of home-based care.

Thus, the intelligent nursing system for the elderly based on big data has broad development prospects and important application value. It can provide more comprehensive, accurate, and efficient support for the health management and elderly care services, contributing to the development of related industries and promoting social innovation.

Figure 5. Forecast trend chart of China pension industry market scale from 2018 to 2023
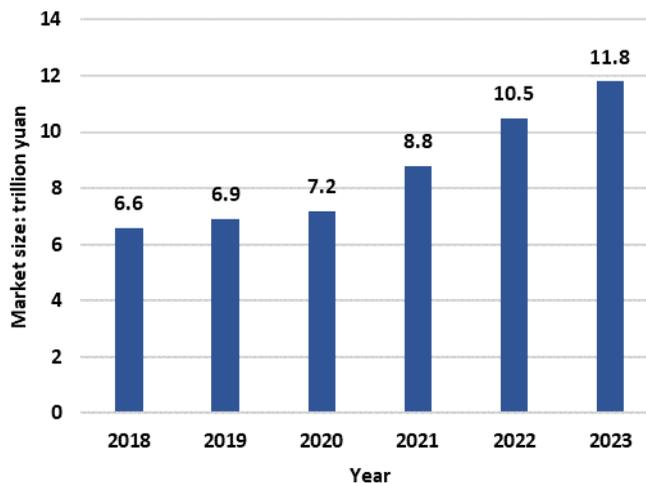
BIG DATA AND ELDERLY CARE

Realizing the Combination of Big Data and Elderly Care

Big data can offer numerous benefits to elderly care. First, using sensor technology to collect physiological data, movement, and environmental data of the elderly enables automatic monitoring and alarm functionalities. For example, smart mattresses can monitor the sleep patterns of the elderly, and smart home systems can detect dangers like gas leaks.

Second, the static characteristics of the sensor indicate the output-input relationship of the sensor when each value of the measured input is in a stable state. The sensor's indicators include linearity, return error, and sensitivity. Among them, linearity (or nonlinearity) represents the index of the degree of coincidence (or deviation) between the sensor's output = input calibration curve and the selected fitting straight line (working straight line). Its expression is as follows:

$$\Gamma_L = \pm\, (\Delta L_{Max} / y_{Fs})*100\% \tag{1}$$

The return difference (hysteresis) can be understood as follows: the output and input curves of the sensor do not coincide in both the positive (input increase) and negative (input decrease) strokes.

$$\gamma_H = \left(1/2\right)\left(\Delta H_{MAX} / y_{FS}\right)*100\% \tag{2}$$

Among these indicators, it represents the maximum difference in output when the input is the same between forward and backward strokes.

$$\Delta H_{MAX}$$

The (static) sensitivity in sensitivity represents the ratio of the increment of the sensor output to the increment of input. The sensitivity of a linear sensor is the slope of a fitted straight line, and its expression is as follows:

$$K = \Delta y / \Delta x \tag{3}$$

Equation 3 is used to express the sensor's ability to respond to changes in input.

The expression of sensitivity often includes power supply voltage factors, such as 100(mv/mm.v). However, the sensitivity of the nonlinear sensor is not constant. It is usually expressed by: dy/dx.

Robotics plays an important role in elderly care, improving the efficiency and quality of care while reducing the burden on caregivers. Robots can assist older individuals in daily tasks like dressing, washing, and medication administration, providing safe and convenient care through intelligent design and operation. The use of robots allows the elderly to enjoy a more comfortable and attentive care experience.

The evolution of chatbots is a pivotal feature in smart care systems, offering psychological support and companionship for the elderly. These bots excel not only in engaging in simple and warm conversations with older individuals, but also in providing advice and solutions that target mental health, thus offering valuable emotional support in their daily lives.

Data analysis is another important function of the system. By conducting in-depth analysis of the behavioral patterns and living habits of the elderly, the system can provide more personalized

services. These data not only help to identify potential health problems in a timely manner but also serve in formulating targeted care plans to prevent and improve the health of older individuals.

Connected healthcare services are essential features realized through IoT technology, enabling older individuals to conveniently connect remotely with doctors, caregivers, and family members. Through smart devices, these individuals can consult their doctors on health issues at any time, while doctors can remotely monitor the health status of older patients for timely intervention and management.

Intelligent health monitoring utilizes big data and AI technology to monitor the health of the elderly in real time. Through technologies like speech recognition, the system can analyze the words and actions of the elderly, identify potential health problems promptly, and provide appropriate advice and alerts to the elderly. The implementation of this feature will help improve the quality of life for the elderly and offer caregivers a more comprehensive health management tool. The scale of the AI market in China from 2017 to 2022 is shown in Figure 6.

AI technology can be used to formulate personalized nursing plans for the elderly according to their individual needs and health status. By analyzing health data, the AI system can create targeted health management plans for the elderly, including suggestions on diet, exercise, and medication.

Using AI technology, nurses can make auxiliary diagnoses of common diseases like stroke, diabetes, and heart disease. By analyzing health data, the system can identify risk factors for diseases and provide relevant treatment suggestions.

An intelligent security system can be established to assist the elderly in preventing issues like falls and loss. Through smart home equipment and security monitoring equipment, the system can monitor the security situation of the elderly in real time and trigger alarms when problems arise.

Figure 6. China AI market scale from 2017 to 2022
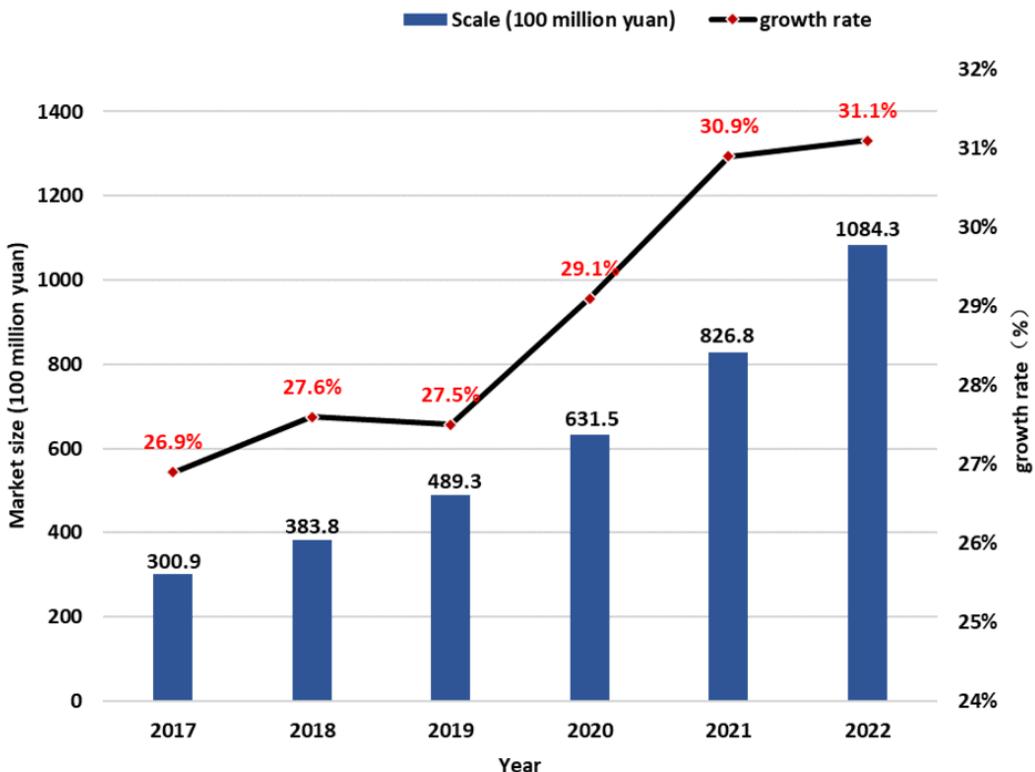
In the future, it is conceivable to establish a specialized training team for elderly care. This team, equipped with AI technology, can provide personalized services to the elderly and support human caregivers in their work.

In summary, the integration of big data technology with elderly care has the potential to enhance the quality of life for the elderly, increase the efficiency of nursing staff, and reduce overall care costs. However, careful attention must be given to protecting the privacy and safety of the elderly, ensuring the legality and compliance of big data in elderly care. It should be noted that although AI technology can improve efficiency and quality, it cannot replace the role of human caregivers. Therefore, in the process of combining AI with elderly care, we must prioritize the human factors to ensure that the well-being and safety of the elderly.

Realizing the Intelligent Nursing System for the Elderly Based on Big Data

The key steps to realizing the intelligent nursing system for the elderly based on big data are as follows. First, various sensors, monitoring devices, and smart wearable devices collect and store health data, behavior patterns, and living habits of the elderly in a database. Second, collected data is cleaned and processed by eliminating abnormal and missing values. Simultaneously, the data is normalized and standardized to prepare for subsequent analysis and modeling. Third, using data analysis and mining technology, we find the laws and trends in the health status and living habits of the elderly. In addition, we can uncover potential risks and problems, providing a basis for subsequent prediction and early warning systems. Fourth, based on the collected data and analysis results, prediction models and early warning systems are established using algorithms like machine learning and deep learning. These models aim to predict and issue warnings on the health status and behavioral habits of the elderly, facilitating early reminders and interventions. The confusion matrix serves as an index to judge the results of the model, particularly in assessing the quality of classifiers for data models. Among them, key indicators include:

- **TP (true positive):** The true value is positive. The number that the model thinks is positive.
- **FN (false negative):** The real value is positive. The number that the model thinks is negative.
- **FP (false positive):** The true value is negative. The model thinks it is positive.
- **TN (true negative):** The true value is negative. The model thinks it is negative.

In addition, the meanings and expressions of accuracy, sensitivity, specificity, and recall are as follows.

The significance of accuracy (ACC) is the proportion of all correctly judged results in the classification model to the total observed values. Its expression is:

$$\text{Accuracy} = \frac{\text{TP} + \text{TN}}{\text{TP} + \text{TN} + \text{FP} + \text{FN}} \tag{4}$$

Table 1. Indicators in the confusion matrix

Confusion Matrix		True Value	
		Positive	Negative
predicted value	Positive	TP	FP
	Negative	FN	TN

The meaning of accuracy rate (PPV) is the proportion of model prediction pairs among all the results in which the model prediction is positive. Its expression is:

$$\text{Precision} = \frac{\text{TP}}{\text{TP} + \text{FP}} \tag{5}$$

The significance of sensitivity (TPR) is that the model predicts the proportion of pairs among all the results whose true values are positive. Its expression is:

$$\text{Sensitivity} = \text{Recall} = \frac{\text{TP}}{\text{TP} + \text{FN}} \tag{6}$$

The significance of the specificity (TNR) is that in all the results where the true value is negative, the model predicts the proportion of the pair. Its expression is:

$$\text{Specificity} = \frac{\text{TN}}{\text{TN} + \text{FP}} \tag{7}$$

The fifth step in implementing intelligent systems in care focuses on personalized services. This includes offering individualized advice and guidance on medical treatment, diet, exercise, and other aspects. Conducting regular health assessments and monitoring ensures timely identification and resolutions to issues. Finally, step six underscores the importance of ongoing optimization and improvements within the system. Regularly refining and improving the intelligent nursing system for the elderly will enhance its accuracy and stability. At the same time, it will improve the satisfaction and trust of the elderly.

The intelligent care system monitors the physiological parameters of the elderly in real-time by accessing various sensors and devices, such as heart rate monitors, blood pressure monitors, blood glucose meters, etc. The collected data is uploaded to the cloud platform for analysis. With the help of deep learning and data mining technology, the system analyzes the health data of the elderly, realizing the assessment and early warning of disease risks. Intelligent algorithms, based on big data, identify potential health risk factors and provide personalized health management advice. This includes customized diet, exercise, and medication management programs, as well as regular health consultation and reminder services, providing comprehensive personalized care for the elderly.

In conclusion, the intelligent care system for the elderly based on big data can provide more comprehensive and meticulous care services for the elderly. In addition, it provides more effective management and support for the families and communities of the elderly, holding important social value and significance.

Enhancing the Effect and Function of the System

In addition to the aforementioned steps, incorporating other technologies and methods can enhance the effectiveness and functionality of the intelligent care system for the elderly based on big data.

First, natural language processing technology allows the system to understand the language expressions of the elderly, providing more intelligent responses and suggestions according to their verbal content. This improves the interactive experience and satisfaction for the elderly.

Second, integrating virtual reality allows the elderly to engage in health activities like simulated swimming and running. This feature fosters motivation and enthusiasm.

Third, employing blockchain technology ensures the security and privacy of elderly data. This not only safeguards their information but facilitates efficient data sharing and exchange within the system.

Fourth, using telemedicine technology enables remote monitoring and diagnosis of the elderly, offering more convenient and intimate medical services.

Finally, implementing social networking technology helps the elderly connect with peers, share experiences, and communicate with family members and nursing staff. This can reduce their loneliness and anxiety.

To sum up, the intelligent nursing system for the elderly based on big data holds significant promise and offers valuable applications, providing better healthcare services for the elderly and delivering intelligent management and support for families and communities.

CONCLUSION

The relationship between traditional elderly care and intelligent systems is complementary, with each addressing different aspects of elderly care. While traditional care focuses on emotional care and intrapersonal contact, intelligent systems provide real-time monitoring and remote management, enhancing efficiency and personalization of care. The introduction of intelligent systems can help solve the problem of insufficient nursing staff and improve overall service quality. However, careful attention is needed to address challenges like privacy concerns.

In the context of the aging trend, this study aims to improve service effectiveness, enabling personalized care plans, remote monitoring, emergency response, and healthcare cost reduction. Real-time health data monitoring allows for predicting health risks and providing personalized care plans. The remote monitoring and emergency response functions facilitate quick access to patient data for healthcare professionals, ensuring timely interventions. The application of big data is expected to reduce medical emergencies, thereby lowering healthcare costs. This research provides an innovative solution to promote intelligent geriatric care services, addressing the challenges of an aging society.

As the social economy progresses, technology advances, medical care improves, and life expectancy extends. Thus, addressing aging becomes a prominent societal concern. The intelligent nursing system for the elderly, grounded in big data, represents a paradigm shift in public healthcare management, emphasizing the maximization of elderly care. Utilizing big data is crucial to drive the optimization of the elderly care model.

Looking ahead, big data will continue to permeate the realm of intelligent elderly care, refining mechanisms to better suit the diverse needs of the elderly. The goal is to provide a range of efficient nursing services tailored to individual requirements.

In summary, integrating big data into elderly care can effectively alleviate strain on nursing staff, enhance work efficiency, ensure patient safety, and deliver high-quality care. However, challenges like technical bottlenecks, social trust, and ethical concerns need to be addressed collaboratively across fields to achieve optimal results in applying big data to elderly care.

DATA AVAILABILITY

The figures used to support the findings of this study are included in the article.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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