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Practice and Exploration of Machine Learning Algorithm in Program Optimization of Personalized Nursing

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ABSTRACT

As an important branch of artificial intelligence, machine learning algorithm has shown a wide range of application prospects and significant advantages in the optimization of personalized care programs. It can provide accurate diagnostic support, real-time health monitoring and personalized adjuvant treatment for patients by analyzing multi-source medical data, effectively improve the scientificity and accuracy of nursing programs, and alleviate the workload of nursing staff. We should improve the ability of nurses to understand and apply machine learning technology, to achieve more efficient, more accurate, and more personalized medical care services, and promote the innovation and development of medical care model.

KEYWORDS

Machine learning; Program optimization; Personalized nursing

1. INTRODUCTION

Artificial intelligence is a new technical science that studies and develops theories, methods, technologies and application systems that can simulate, extend and expand human intelligence. It obtains and perceives the environment through data, collects and interprets data, infers or processes knowledge, obtains information from data, and takes the best action to achieve the established goals. In recent years, artificial intelligence has been widely used in computer-aided diagnosis, expert systems, medical robots, medical equipment management, in-depth learning, image recognition, etc [1]. As the latest achievement in the development of this field, generative artificial intelligence, represented by generative pre-training conversion programs, has taken a big step towards the development goal of emotional and universal artificial intelligence. Machine learning is a branch of artificial intelligence, which aims to enable computers to acquire knowledge and experience from data through learning and automated reasoning of computer systems, and to use these knowledge and experience for pattern recognition, prediction and decision-making. The core idea of machine learning is to use data to train computer algorithms so that they can automatically learn from data and improve their performance without explicit programming [2]. By analyzing and interpreting large amounts of input data, machine learning algorithms can identify patterns and trends in the data and generate predictive models that can be applied to new data. Machine learning algorithms can be divided into supervised learning, unsupervised learning and reinforcement learning. Supervised learning uses labeled training data to train a model to predict labels or target values for new data. Unsupervised learning is to discover hidden structures and patterns from data without labels. Reinforcement learning maximizes the cumulative reward through interactive learning with the

environment. This article will focus on the application of machine learning algorithm in the optimization of personalized nursing program, to provide a reference for hospital workers.

2. APPLICATION STATUS OF MACHINE LEARNING ALGORITHM IN PERSONALIZED NURSING PROGRAM OPTIMIZATION

2.1. Personalized Medical Diagnosis

Currently, applying machine learning technology to the latest biomedical data and electronic health records, healthcare workers can quickly mine accurate, empirical and effective information, greatly saving time and reducing subjective misjudgments. Machine learning-aided diagnosis has been widely used in breast cancer pathology identification, skin cancer screening, diabetes diagnosis, colonoscopic polyp detection and so on. It is worth mentioning that the technology of applying machine learning to medical image analysis has covered almost all parts and organs of the imaging equipment. At the same time, machine learning prediction models have been developed, including sepsis prediction, risk prediction of rebleeding in patients with gastrointestinal bleeding, ventilator extubation failure prediction and man-machine confrontation prediction. In addition to assisting doctors in diagnosis, machine learning technology is also an important research topic for decision support of nursing staff. For example, the algorithm developed by Laures et al on the basis of evidence-based evidence can help pediatric nurses choose the most suitable pain assessment method for patients and improve pain assessment practice [3]. Nursing diagnosis is a comprehensive analysis of patients from physiological, psychological, social and other aspects by nursing staff, so as to determine the nursing plan. Preliminary studies have shown that the nursing diagnosis made by machine learning is highly consistent with the nursing diagnosis made by senior nurses. The diagnosis time of machine learning was significantly shortened, which greatly improved the efficiency of nursing work. In addition, machine learning technology can also assist patients with Alzheimer's disease and other cognitive disorders to determine nursing goals, formulate nursing strategies, and make nursing diagnosis based on gender, race, cultural background, socio-economic status, clinical stage, disease progress and other information according to the dialogue between patients and healthcare workers [4].

2.2. Personalized Health Monitoring

Based on the patient's historical health data, genetic data and so on, machine learning can help provide personalized treatment plans. Portable sensors are used to collect individual daily data for personalized health monitoring and real-time risk inference, thus forming health tips, which are more popular in daily life [5]. Common non-invasive wearable devices include wrist-worn, head-worn, decorations, electronic textiles, electronic patches, etc. These smart devices play an important role in many medical scenarios. The importance of real-time health monitoring is self-evident, and artificial intelligence technology makes real-time health monitoring and risk early warning a reality. The condition of critically ill patients may deteriorate rapidly in a short period of time, while patients with chronic diseases need long-term attention to relevant indicators to assess the progress of the disease, and acute diseases are often invisible from the appearance before the onset [6]. Remote health care system can intelligently monitor physiological signals such as body temperature, blood pressure and heart rate of patients by using machine learning technology, and give abnormal alarms. Among them, the intelligent image analysis algorithm can identify whether the patient has phlegm blocking symptoms to help the patient get timely care. Recently, some foreign scholars have developed a deep learning model for predicting atrial fibrillation in sinus rhythm with ECG characteristics, which reduces the need for continuous monitoring of patients. Mott Children's Hospital in the United States uses artificial intelligence monitoring system to analyze children's data and generate risk index to

assess the probability of cardiac arrest in children to remind healthcare workers to take targeted interventions in advance to reduce the risk of cardiac arrest, disability and mortality rate in children.

2.3. Personalized Adjuvant Therapy

Machine learning can not only provide higher quality care services for patients, but also reduce the workload of nursing staff in various clinical scenarios. These application scenarios include intravenous dispensing, sputum suction, guidance, nursing and rehabilitation, as well as transportation of goods and patients. For example, the first intelligent intravenous dispensing robot developed in China has been put into clinical use, which greatly improves the efficiency of dispensing, reduces drug residues, and effectively reduces the occurrence of dispensing errors. The sputum suction robot independently developed by the First Affiliated Hospital of Xi'an Jiaotong University can set different sputum suction parameters according to the individual conditions of patients, so that the sputum suction operation becomes more standard, more standardized and more sophisticated, while reducing the work intensity of nurses, so that they can focus on more complex nursing tasks [7]. The use of speech recognition technology and intelligent question answering technology makes machine learning guidance robot an effective tool to alleviate the shortage of manpower and improve the efficiency of inquiry, which has been widely used in hospitals in many provinces and cities. In addition, surgical robots represented by "Da Vinci" have been used in thoracoscopic systems for thoracic surgery. It is worth mentioning that machine learning has also shown great potential in the field of nursing education. The research of Guangxi University of Traditional Chinese Medicine found that the clinical teaching robot can effectively improve the concentration and skill mastery of nursing students in the self-learning training of nursing students' skills. Wearable health monitoring system for post-traumatic stress disorder can monitor the nightmare condition of patients and provide optimized solutions for patient condition monitoring and decision-making through machine learning technology [8]. The APP-based telemedicine technology can detect the health indicators of patients after organ transplantation, and form feedback information through the Internet, provide decision-making and early intervention for patients, remind patients to take medicine on time, which reflects the application value of telemedicine in patient health management.

3. SUGGESTIONS ON THE APPLICATION OF MACHINE LEARNING ALGORITHM IN THE OPTIMIZATION OF PERSONALIZED NURSING PROGRAM

3.1. Improve the Accuracy of Personalized Nursing Program

With the help of physiological, drug intervention and laboratory test data from different sources, as well as medical images and clinical text records with different modalities, artificial intelligence technology can capture the complexity of human health and disease, and comprehensively judge the patient's condition to generate a more comprehensive medical care strategy. The application of these multi-modal data has shown better diagnostic performance in a range of different tasks. With the development of artificial intelligence-assisted nursing technology, the nursing process has become more automated, accurate and controllable, which will greatly improve the traditional working mode of optimizing hospital, clinic, community and family nursing. In the traditional clinical nursing scene, the nursing decision-making and nursing methods adopted by nurses are often different from person to person, and their behavior is largely affected by work experience and personal judgment, which is subjective and uncertain. In addition, the high-intensity and long-term physical labor in the process of clinical nursing will cause a greater burden on nurses' body and mind, and have a certain impact on the quality of nursing [9]. Artificial intelligence technology can combine authoritative domain knowledge to quickly calculate the optimal nursing plan for different patients, which is conducive to reducing the occurrence of errors, reducing the incidence of adverse events after operation, and

improving the quality and efficiency of nursing work. Nurses' understanding of artificial intelligence. At the same time, nursing leaders should also support the application of artificial intelligence robots in nursing, and advocate reforms if necessary to ensure fair representation of robots in the field of nursing.

3.2. Optimize the Scientificity of Individualized Nursing Program

Machine learning models can learn and optimize care plans in real time, dynamically adjusting care strategies according to patients' response to treatment. This dynamic adjustment ability not only improves the scientificity and effectiveness of nursing programs, but also reduces nursing errors caused by individual differences. Machine learning is not only to reduce the burden on nurses, but also to provide higher quality nursing experience for patients. In fact, nurses are seldom consulted or introduced in the development and testing of artificial intelligence technology [10]. How to integrate AI into the medical field ethically and more effectively in the nursing field should be consulted with nurses working in the same medical field. Although machine learning has made some progress in disease risk prediction, there are still many challenges in how to accurately collect and sort out data, extract and process features to achieve accurate prediction, avoid bad mining information and over fitting of models, and increase accuracy and authority. If the nurse group is integrated into the development of artificial intelligence, it can help nurses provide better, faster and safer nursing services. In order to achieve the perfect integration of artificial intelligence and nursing work, nurses need to have a full understanding of the current clinical application of artificial intelligence, and learn to use it normally. To achieve this, we need the cooperation of multi-level personnel. In terms of education and teaching, nursing educators should add courses related to machine learning ethics education. The clinical application of artificial intelligence can increase the interaction between teachers and nurses with the help of artificial intelligence, and enable nurses to put themselves in the position of clinical cases through artificial intelligence. Clinically, nursing leaders should give full play to their strength. Nurses can improve their understanding of artificial intelligence by discussing with colleagues.

3.3. Protect the Safety of Individualized Nursing Program

Data is the cornerstone of machine learning algorithms, and medical data usually contains a lot of sensitive information about real patients. If not properly managed, people with bad motives may steal these data for illegal transactions, thus harming the rights and interests of patients. Therefore, protecting the privacy and security of data is crucial in the development of medical machine learning. Decentralization of data is a way to reduce individual hacker attacks and data leakage, and this technology also makes cross-agency collaboration easier without complex data sharing protocols. The disadvantage is that even after training the model, the machine learning system still faces the risk of privacy disclosure, and sometimes the original data used in training can be reconstructed only by checking the resulting model. In the process of using machine learning algorithms, data security and privacy protection are crucial considerations. With the development of information technology and the advent of the era of big data, the issue of data security and privacy protection has become increasingly prominent and become the focus of public attention. Caregivers should always be aware of the sensitivity and importance of patient information. When using machine learning algorithms, we must strictly abide by the relevant privacy protection policies and regulations to ensure the security and confidentiality of patient data. At the same time, the use of machine learning algorithms should not infringe copyright, privacy, security and confidentiality regulations. Medical institutions and management can carry out training and education on data security and privacy protection to enable nursing staff to understand how to store, transmit and process patient data correctly, avoid risks such as data leakage or unauthorized access, and comprehensively enhance their security awareness and coping ability. How to improve data privacy and security in medical AI applications and balance the interpretability of the model at the same time remains to be further explored by researchers

4. CONCLUSION

AI is in its infancy, and its long-term impact is not yet clear. What is certain is that machine learning will have a transformative impact on health care services, innovative methods, and people's perception of health care. In the future, data from wearable devices and implants will improve our understanding of human biology and how drugs work, providing personalized and real-time treatment for all. The use of AI in health care requires a standardized and standardized approach to ensure that all stakeholders, including patients and health care practitioners, enjoy their rights and receive corresponding protection.

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