A study of the Application of Artificial Intelligence in the Medical Health

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Abstract—With the continuous increase of artificial intelligence application and deep understanding of artificial intelligence, artificial intelligence and integrated information processing, comprehensive data analysis and decision-making, and deep learning optimization gradually show its advantages compared with traditional technologies.At the same time, many problems in the field of medical and health have presented their complex and systematic characteristics, such as disease diagnosis and treatment, epidemiological control, precision medicine and so on.The combination of artificial intelligence and medical health will bring great value to the application of artificial intelligence. Based on the characteristics of both, combined with the current artificial intelligence application scenarios in the medical and health field, this paper will summarize and analyze the current status of existing artificial intelligence medical health. References are provided by relevant research personnel.

Keywords—artificial intelligence, medical health, application

I. INTRODUCTION

Artificial Intelligence (AI).It is a new technical science that studies and develops theories, methods, techniques, and applications for simulating, extending, and extending human intelligence. Since the 20th century, with the development of production practices and scientific experiments, science and technology have become interdependent and mutually reinforcing, and they are increasingly moving toward integration.On the one hand, the advancement of technology depends to a large extent on the guidance of scientific theories; on the other hand, the development of science is inseparable from advanced technological means, and science is increasingly characterized by engineering technology.The mutual penetration of science and technology has significantly shortened the cycle of science from discovery to application, and accelerated the speed of scientific materialization.The combination of artificial intelligence and artificial neural networks, big data analysis, cloud computing and other technical research topics, artificial intelligence integrates computer, cybernetics, philosophy, information theory and other different language disciplines to form a comprehensive curriculum, a new theory of breaking, new technology is at the forefront of world development.At the same time, along with the development of technology and theory in the medical field, the application of artificial neural network, expert system, information extraction, data mining and other technologies combined with artificial intelligence, corresponding to the diagnosis, treatment, management and other aspects of the medical field, is huge and far-reaching impact.

In the 1950s, the concept of artificial intelligence was first proposed as a new discipline.In the future development, artificial intelligence is widely used in various fields, and its development has been widely concerned by the society. However, its definition of specific concepts is different and has not been unified.American artificial intelligence center scholars have defined their concepts as being recorded, summarized, reproduced, and applied in different fields.The President of the Public Hakodate University of the future in Japan has designated it to generate intelligent systems through manual forms.The world's top artificial intelligence transfer, the ethics committee chairman of the Japan Artificial Intelligence Society proposed artificial intelligence as a computer system that can be observed and discovered by artificially mimicking human intelligence; it can form feature quantities in many information data and process the phenomenon. Different scholars have different concepts for artificial intelligence, but the same is that they have a certain understanding of artificial intelligence.After half a century, artificial intelligence has been rapidly developed and attracted worldwide attention and has been recognized and applied by various industries.

At present, artificial intelligence is widely used in the field of medical and health, and there are common auxiliary medical treatment, medical imaging, drug excavation, health management, emergency room and medical management, wearable equipment, nutrition management and virtual assistants, etc. Great exploration and research on the application of artificial intelligence in the field of medical devices.As early as

2011, IBM applied the robot Watson to the field of medical equipment, and strengthened cooperation with Apple, New York Gene Center, Pfizer, etc., including health data analysis, tumor sequencing and patient remote monitoring.In February 2016, Google Deep Mind announced the establishment of the Deep Mind Health division and cooperated with the UK National Health System to assist in its decision-making.At the same time, the department cooperated with Royal Free Hospital and Moor Field Eye Hospital to jointly develop various advanced medical software, which will help doctors to quickly obtain medical results and correctly identify visual diseases.In 2016, Microsoft applied artificial intelligence to the medical health plan Hanover, in order to find the best drugs and treatments in the shortest time. In 2016, Baidu launched Baidu brain, which will simulate doctors and help doctors ask questions quickly and accurately.From the above examples, it can be seen that the development and application speed of artificial intelligence in the field of medical health is accelerated. The following will discuss the application of artificial intelligence from the aspects of medical-related diagnosis, treatment, monitoring and drug optimization in combination with various scenarios in the medical and health field.

II. APPLICATION OF AI IN THE DIAGNOSIS AND TREATMENT PROCESS

Face recognition and verification identity during the diagnosis and treatment process.The traditional medical treatment process involves registration, payment, and printing of reports, and each link is bound to undergo identity verification.After the introduction of AI technology, this process can be achieved by means of face recognition, speeding up the efficiency of medical treatment.Face recognition refers to the process of determining the position of the unmanned face and the face in different scenes. The main methods are motion model based method, skin color information based method, motion information based method, local organ feature based method. They all use relevant heuristic knowledge to achieve fast tracking.Face tracking refers to the process of determining the movement trajectory and size of a face in the input image sequence. The main methods are artificial neural network based method, eigenface based method, heuristic rule based method, clustering based on clustering. method based on cluster learning, method based on support vector machine.The components usually include the Euclidean distance, curvature, angle, etc. between the two points on the face, the extraction and recognition of the continuous shape of the facial features, and in fact the vector representation based on the geometric features.This method has a positive effect on improving registration efficiency and effectively confirming patient identity.

III. APPLICATION OF AI IN AUXILIARY IMAGE DIAGNOSIS

Computer-aided diagnosis (CAD) is the use of advanced computer hardware and software to analyze and process digital radiographic images to detect well-detected lesion characteristics. The results are used as a "second opinion" for reference by diagnosticians to help radiology. Physicians improve the detection rate of lesions, which is called the "second pair of eyes" of radiologists, which can improve the diagnostic accuracy and improve the reproducibility of diagnosis, shorten the reading time and improve work efficiency.The imaging techniques of various gods in medical imaging, including plain film, CT, MRI, ultrasound and PET, can be introduced into the CAD system.Image examination of any part of the human body can improve the accuracy of diagnosis by means of CAD.Most of the current CAD research is in the level of breast and thoracic pulmonary nodular lesions. The CAD of other parts of the body is still very rare and immature. The CAD study of breast and pulmonary nodular lesions basically represents the current CAD in medical imaging. The highest level and basic status of the birth and development of computer and artificial intelligence technology laid the foundation for the development of computer-aided detection systems in the medical field[1] .The use of AI technology to assist in the diagnosis of medical imaging data, improve the accuracy of diagnosis and treatment and improve the efficiency of image diagnosis play an active role.

IV. AI IN THE APPLICATION OF PRECISION MEDICINE

In 1985, American scientists pioneered the Human Genome Project, which aims to determine the nucleotide sequence of 3 billion base pairs contained in human chromosomes and map the human genome to achieve the ultimate goal of deciphering human genetic information.The implementation of the program has promoted the rapid development of genomics, proteomics and bioinformatics, and laid an important technical foundation for the realization of precision medicine.On January 30, 2015, US President Barack Obama presented a precise medical plan in his State of the Union address: an approach to emerging prevention and treatment based on individual genes, environment and lifestyle.Pushing the world's precision medical development to a climax[2].Accurate medical treatment is of great significance to the development of modern medicine. Through the implementation of the precise medical model, it is expected to improve the overall health of human beings.The content of precision medicine mainly includes accurate diagnosis, precise treatment and precise prevention of diseases.Artificial intelligence can analyze and process massive amounts of genetic information by using its powerful data processing and deep learning theories and methods.At the same time, the comprehensive analysis and data

mining of the development of the patient's condition, the treatment and the record of medication, and the comprehensive judgment of the disease as a whole, and multidisciplinary comprehensive treatment have broad significance.In precision surgery, artificial intelligence has also made certain breakthroughs. Through artificial intelligence-based computer-assisted surgery technology, doctors can help plan the optimal surgical path and achieve minimal trauma to patients to maximize the recovery of patients. Computer-assisted surgery and surgical intelligent display systems have been able to help doctors understand the relationship between liver cancer lesions and organ tubing systems, calculate organs and lesion volumes, and determine surgical removal routes.It plays an active role in improving surgical efficiency and reducing surgical trauma.

V. APPLICATION OF AI IN EPIDEMIOLOGICAL PREDICTION AND ANALYSIS

Artificial intelligence, while making medical work more refined and specialized, also plays an important role in effectively conducting health warnings, identifying potential disease risks, or predicting the likelihood of high disease.When it is discovered that it is a potential patient, it can take auxiliary measures in advance to conduct health management promotion or provide information, remind the user to go to the hospital for examination, etc., to avoid the occurrence of the disease, or delay the occurrence of the disease.It is worth noting that at this stage, China's disease prevention work is still focused on emergency treatment in the event and afterwards. At present, the public health work of developed countries in the world has developed to focus on "disease prevention".In 2008, Google launched Google Flu Trends (GFT), a software used to predict the flu epidemic. Designers believe that the search keywords entered by people represent their immediate needs and reflect the user's situation.To facilitate the association, designers have compiled a "package" of flu keywords, including thermometers, flu symptoms, muscle pain, and chest tightness.As soon as the user enters these keywords, the system will perform tracking analysis to create regional flu charts and flu maps.Although the final results of GFT predictions are significantly different from the monitoring reports of the Centers for Disease Control and Prevention (CDC), this is an example of the interpretation of big data analysis in the medical field, especially in epidemics. The guiding aspects of forecasting raise important thinking.

VI. AI IN THE APPLICATION OF ENSURING MEDICAL QUALITY

The Medical Decision Support System (MDSS) is a computer system[3] that fully utilizes computer technology to support clinical decision-making for semi-structured or unstructured medical problems.It has a large knowledge base, including many years of experience in the diagnosis and treatment of experts, real-time updated professional knowledge, can simulate the human thinking process, combined with the patient's condition to provide accurate reference in pre-diagnosis, support in the diagnosis, and post-diagnosis evaluation.Thereby ensuring medical quality and safety effectiveness.At present, the most famous decision support system is Super Computer Watson. By asking patients about the symptoms, medical history, natural language processing, parallel computing, machine learning and other abilities, they can quickly search and analyze memory data, give diagnosis tips and treatment opinions. And the new treatment plan is passed to health care providers around the world.Introduced by Archimedes Model, IndiGO uses more than 30 variables to measure each user's medical information to achieve individualized guidance and decision-making goals, as well as recommendations for disease prevention and early intervention[4].Since its inception in 1986, the DXplain launched by the Massachusetts General Hospital has included 2,400 diseases and 230,000 data points. The matching data is comprehensive and timely, and it is still widely used throughout the United States[5].The Up To Date launched by Wolters Kluwer is the most widely used medical database. It has more than 1 million users from more than 180 countries and has extracted more than 10,500 special reports from 24 medical specialties. Real-time access to clinically available information and assisted diagnosis[6].

VII. AI IN THE APPLICATION OF DRUG MINING

The application of artificial intelligence in drug excavation will greatly reduce the development cycle of new drugs, effectively increase the success rate, and use computer simulation to scientifically and reasonably predict drug activity, safety and side effects.Take Atomwise in Silicon Valley as an example. It is a drug research and development company that conducts a lot of research and analysis on artificial intelligence, and uses IBM supercomputer to scientifically and rationally screen the treatment methods in the molecular structure database.By evaluating the use of powerful computing power, more than 8.2 million candidate compounds have been evaluated, significantly reducing R&D costs and shortening the research cycle[7].In 2015, Atomwise used the artificial intelligence algorithm to find out the candidate drugs for controlling Ebola virus within 24 hours according to the existing drug candidate. In the past, people spent at least several months or even years in the research process. Time to find the right drug candidate[8].In 2012, Merck began research on the identification of virtual screening statistics technology, which was initially initiated by data technology company Kaggle.At this stage, Kaggle has applied artificial intelligence and deep learning, and cooperated with the artificial intelligence drug discovery startup

Atomwise.Through the application of artificial intelligence, Atomwise can analyze and test more than 7,000 kinds of drugs within 24 hours, and find out the treatment plan for controlling Ebola virus, which has made great contributions to human health and safety.

In short, with the development of artificial intelligence, it has gained more and more attention in the field of medical and health, and has broad application prospects.However, it is still necessary for the majority of medical and health workers, computer experts and other cross-disciplinary collaboration to develop more intelligent applications, to provide doctors with more accurate diagnosis and treatment assistance, and to bring higher quality medical services to patients.At the same time, supporting research and discussion in related fields such as medical ethics, policies and regulations are also facing the challenge of reform and renewal.

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