

Breakthrough and Development in the Field of "Internet +" Intelligent Medicine in the Post-epidemic Era

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Abstract

The outbreak of COVID-19, which has invaded the world, has caused a huge impact on the health care system of the world. The enormity of the epidemic underscores the importance of vigorously developing and promoting changes in the medical sector. In recent years, with the deepening development of computer technology, the "Internet +" intelligent medical field has achieved breakthrough increasingly, from the early drug design, the forecast experiments on drugs, to doctors in clinical practice, "Internet +" medicine made considerable development, and in this outbreak, also play an important role.

Keywords

Post-epidemic era; Medicine; COVID-19; Computer aided drug design; AI diagnosis system.

1. Introduction

The COVID-19 outbreak in 2020 had a serious impact on the global economic development, and the global spread of the virus had a repeated impact on the health care system of various countries. Compared with SARS virus in 2003, MERS virus in 2015 and COVID-19 at the end of 2020, we are more aware of the importance of drug and vaccine research and development, and the importance of information technology support in the biomedical field is also more aware of the COVID-19 epidemic. Biological pharmaceutical industry, referred to as the focal point of each country development direction, biological medicine industry development situation is still grim, however, we need to seize the drug development opportunities brought by informationization development era, under the background of "Internet +" do a good job in pharmaceutical innovation research and development, constantly promote the intelligent medical breakthroughs and development, and at the same time, we also need to be actively respond to challenges, innovation and development medical diagnosis service mode, improve accessibility, people build new biomedical development after the outbreak time medical service pattern.

2. Computer Aided Drug Design

Computer aided drug design is a multidisciplinary field that combines traditional drug design with powerful information retrieval, model matching, virtual screening and other functions of computer.

When compared to traditional drug design, a large number of synthesis of unknown compounds, and a large number of screening, get a lot of experimental data were analyzed, and then selected, the last to get somewhat promising drug screen operation, computer aided drug design, change the cost a lot of manpower material resources, and low success rate, the method of causality from disease, namely the target enzyme of computer huge database is used to determine the active site of target enzyme as well as the interaction between drug and target enzymes, such as design and simulation technology using computer graphics, the three dimensional structure

of enzyme, puts forward the structure of the inhibitor, synthesis of small amounts of compounds, After the experiment, the most promising compounds were obtained for further study [1-4].

As early as the 1980s, computer-aided drug design made a great impact. In the treatment of some easily proliferative diseases, such as cancer, dermoses and bacterial infections, cells multiply rapidly and need to synthesize large amounts of DNA, and TS inhibitors can inhibit DNA synthesis through physiological mechanisms [5]. By analyzing the molecular structure of TS, computer simulation was used to simulate the molecular structure of TS -- drug complex, and drug molecular modification was carried out to improve the fit degree. After that, more chemical matching was further studied. It is this method that gave birth to a series of anti-cancer drugs, highly efficient, in a short period of time to relieve sudden symptoms; Low cost, sharing medical burden for patients [6, 7].

At present, the application fields of computer-aided drug design are becoming more and more extensive, and the methods are also increasing. In the research fields of Alzheimer's drugs, hepatitis C virus preparations, the study of novel coronavirus, and the screening of cosmetic plant source effective raw materials, computer-aided drug design provides new ideas [8-10].

For example, in the face of aggressive novel coronavirus, the prescription of strengthening the upright and avoiding the plague has obvious preventive effect on it, and it is of great preventive significance to use computer-aided drug design to explore its internal mechanism. In large computer database to retrieve the centralizer avoid wen party related compounds and their chemical structure, then through computer aided drug design of homologous mould building, such as molecular docking technology from virus invasion to internal body mediated the three-dimensional structure of protein [11-16], find out the target location and the characteristics of the corresponding matching large database similar quality of compound structure characteristics, determine its affinity with traditional Chinese medicine (TCM). Through the prediction of the direction of the target, the interaction strength between the target and the site was verified [17, 18]. Based on the computer-aided drug design technology, the preventive effect and mechanism of the chemical components in the prescription for strengthening and avoiding disease on novel coronavirus were deeply explored, which provided the theoretical basis for the further optimization of prescription judgment and optimization direction, and laid a solid scientific and technological shield for human beings to fight against the unknown powerful virus.

Not only such, cosmetics, also have the use of computer aided drug design technology, for the use of cosmetics raw material source of plant compounds for large data input structure information (19, 20), and then on the basis of skin related physiology, 3 d protein structure of related functions, such as water channel protein family associated with moisturizing, analyze its targets information, and data with the input entered by the ligand matching, fast locking categories from a large number of plant sources compounds similar degree high compound types, cosmetic effect of in-depth research (21-25). In such a luxury field as cosmetics, the application of computer-aided drug design can reduce a lot of labor costs and make cosmetics, which gradually become necessities from luxuries, affordable to more customers economically. And in terms of safety and efficacy, cosmetics have always been of high input and low yield. Through this technology, compounds with the highest matching degree can be obtained from a large number of data, which is safe and efficient, which can greatly increase the brand reputation and improve the popularity and status in the industry. It can be predicted that with the step by step update of computer database, the development of new methods of computer aided drug design technology, as well as its characteristics of low cost and high efficiency, more and more fields related to ligand binding will use this technology.

3. Artificial Intelligence Diagnosis System

3.1. Concept of Artificial Intelligence Diagnostic System

Artificial intelligence diagnosis system is the era of big data the product of artificial intelligence and computer technology development [26], like most of the other applications of artificial intelligence technology, artificial intelligent diagnosis system is also simulated experts brain activity in patients with symptoms, signs and even mental state [27] and so on carries on the intelligence analysis processing of computer application system, which is today's expert system. [28].

A complete artificial intelligence diagnosis system should be composed of knowledge base, database, inference machine, knowledge acquisition module and interpretation interface [29]. Knowledge base contains a large number of rich professional knowledge, mainly is the domain knowledge and heuristic knowledge [30], domain knowledge is equivalent to a doctor after years of learning the basic professional knowledge reserves and heuristic knowledge are doctors to practice medicine after the practical experience of the knowledge obtained is not on the books, theoretical knowledge and practical experience is a doctor of medicine, in the same way, the knowledge base is also the foundation of the whole system is running. The database is used to store the initial information such as the data of the patient's body, as well as a series of intermediate information such as the calculation process and relevant data in the whole diagnosis process. In short, the database is used to store some information of the current objects that need to be processed. According to the initial information collected from the database and the knowledge in the knowledge base, the inference machine uses the exact mathematical model and reasoning strategy [31] to carry out the final result diagnosis according to the final operation and heuristic reasoning results, and is responsible for coordinating and controlling the whole system [32]. The interpretation interface is used to present the diagnosis result basis and specific reasoning process to the doctor, answer the user's doubts about the diagnosis process, and is the interaction window between the system and the user, which is equivalent to restoring the traditional form of outpatient service more effectively. And knowledge acquisition module [33] is equivalent to give the machine itself self learning, the ability of self-renewal, self-correcting, self-improvement, experts are experts, is that they have the ability of self learning knowledge in the books and practice, and a system to achieve truly simulate human experts point should also have the ability to continuously acquire knowledge.

In the process of developing and perfecting artificial intelligence diagnostic system, there are three main problems: knowledge representation, knowledge utilization and knowledge acquisition method. Knowledge representation refers to how to transform the theoretical knowledge in books and the experience knowledge of experts into the unified and exploitable domain knowledge and exploratory knowledge in the knowledge base, namely the formalization of knowledge. Knowledge use is the main research how to knowledge base has been formalized knowledge to solve specific problems, namely the reasoning mechanism of the artificial intelligence diagnosis system, the existing reasoning methods mainly include "symptoms - results" forward reasoning, "suppose" to find evidence of reverse reasoning, and the two mixed repeatedly to get the final result of the positive and negative to the mixed reasoning, the different expert system has according to your own reasoning method on the basis of the demand of the three formed on the basis of suitable models, such as: Inference mechanism based on Bayesian theory, inference mechanism based on fuzzy reasoning theory [34], generative inference mechanism and so on.

3.2. Development History of Artificial Intelligence Diagnosis System

Although artificial intelligence has been applied in medical treatment since early, it has been applied in medical treatment since the late 1950s, but at first it was only used to deal with some of the most simple and routine medical problems, such as calculating the appropriate drug dose and making treatment plan, etc. [35]. But in the early days of artificial intelligence in application, the uncertainty of modeling the most basic problem has always been a big problem hindering the development of the artificial intelligence, until the classical theory of probability and signs of Dempster - Schafers [36] and [37] the bayesian network was invented and applied, replaced the use of symbols the uncertainty of tracing the origin of the uncertainty of research, and until around 1980, in the form of Pearl makes the bayesian network theory on the computer become easy to handle, In 1982, Miller et al. from the University of Pittsburgh published the famous Internist-I internal medicine computer aided diagnosis system, which contained 572 diseases and about 4500 symptoms in its knowledge base. Since then, the application of artificial intelligence in clinical diagnosis has been truly realized. And with the development of computer technology and artificial intelligence and other related technology, artificial intelligence system has been the development and perfection of [38], to today's 21st century, the development of artificial intelligence have a qualitative leap, more has been achieved for the special case of the independent diagnosis, even some problems that may occur in the treatment process can also be predicted in advance and provide the corresponding countermeasures.

3.3. TCM Auxiliary Diagnosis and Treatment System

The research of artificial intelligence diagnosis system in China began in the 1970s. At the beginning, it was applied to the diagnosis of acute abdomen. Later, it gradually expanded to the diagnosis of various clinical diseases, the selection of treatment methods, the selection of surgical methods and indications, as well as the prognosis of diseases. For China, the most distinctive feature is China's TCM auxiliary diagnosis and treatment system, which has long attracted wide attention in the world. One of the most representative is Guan Youbo's liver disease diagnosis procedure, which has seen tens of thousands of patients. However, compared with developed countries, the clinical auxiliary diagnosis and treatment system in China is still in the exploratory stage, so the TCM auxiliary diagnosis and treatment system only exists as an auxiliary system and is mainly a tool to assist clinicians in their work.

Computer is introduced in the 1970 s after the major, major also appeared a lot of modern diagnosis and treatment equipment, such as pulse condition, tongue, such as instrument and sound spectrum analyzer, meridian analyzer, the instrument and computer of TCM diagnosis results of objective, quantitative and standardized play a certain role in promoting, which is mentioned above, the knowledge base of knowledge needs to be one of the formal guarantee. Compared with western medicine of traditional Chinese medicine at the same time, there has been no a unified standard is also hinder the normal auxiliary diagnostic system and even the whole of the major development of traditional Chinese medicine a big problem, but with the in-depth study of scientists, from the monasterksy r.studies show biological differences, JiYaPing professor for the study of basic theory of traditional Chinese medicine such as provide comparison of the objective standard to built include symptoms such as Yang Dianxing, card type, treatment, prescription, Chinese medicine and herbal medicine to the six important aspects of a large database and a new mathematical model of the syndrome differentiation and treatment in mathematical expression, ranging from Xiong Lingzhu web technology, database technology and intelligent retrieval technology three technology, With the efforts of generations of scientists, computers have been gradually applied in all fields of traditional Chinese medicine research, and contemporary traditional Chinese medicine is also gradually becoming informationized and intelligent. In this epidemic, China's TCM auxiliary diagnosis and treatment

system was also applied, which accelerated the speed of expert diagnosis and reduced the misdiagnosis rate of experts, and greatly improved the working efficiency of medical staff.

It is conceivable that with the development of information technology and the Chinese medicine industry advancing with The Times. The information system of TCM diagnosis and treatment will also be improved day by day [40], and this ancient discipline of TCM will surely make greater contributions to the protection of the health of all mankind and shine again.

3.4. Existing Problems and Future Prospects of Artificial Intelligence Diagnosis System

Computer network systems and related technologies will develop faster and more rapidly in the tide of social information and knowledge economy in the 21st century, which is also a great opportunity for the development of artificial intelligence diagnostic system. At present, the ability of machine learning, especially deep learning, of artificial intelligence diagnostic system is not strong enough. Although the accuracy of artificial intelligence diagnosis is higher than that of artificial intelligence [41], it is still not enough. The reasoning mechanism of each system is still relatively simple. The link between experts, the system and the patient is still not strong enough, and the communication between the system and the other two is still not smooth and clear; The medical ethics behind doctors' visits and machine visits [42] and other such problems need to be solved and improved in the future [42].

In addition to these small problems, with the development of modern science and technology, the future development trend of artificial intelligence diagnostic system may have the following two characteristics: First, artificial intelligence diagnostic system should be aimed at solving some special problems. These particular problems have not been studied in computer vision and artificial intelligence. In the aspect of image recognition, the formalization of knowledge base and database content of AI will be strengthened. After all, when a doctor describes his mental process of judging a CT image, it is easy to ignore the details that are helpful for him to judge the final result [44]. One way to improve this is to look at doctors and track their eye movements to collect data. Secondly, [45] the model of artificial intelligence diagnostic system may be based on a variety of intelligent technologies, with the purpose of parallel processing, self-learning ability, memory function and the ability to predict the development of events. Nowadays, the function and reasoning mechanism of artificial intelligence diagnostic system are too single [46].

To sum up, along with the computer technology, artificial intelligence technology and so on some nonlinear technology development and mature [47], artificial intelligent diagnosis system will also get leap type development, the future of artificial intelligent diagnosis system, will be the most effective assistant doctors [48], and for the prevention of disease, diagnosis and treatment to make greater contribution.

4. Conclusion

In the new era of industrial revolution with the continuous development of artificial intelligence, Internet and other emerging technologies, the integration of "Internet +" thought into the development of the pharmaceutical industry is an inevitable path and also the focus of the future. The vigorous promotion of computer-aided drug design has reduced the period of modern drug research and development to a certain extent and greatly improved the efficiency of modern drug research and development. With the establishment and popularization of Internet big data, the continuous improvement of the ability of computer to analyze data and the advancement of new algorithms, medical diagnosis has become intelligent, patient data can be timely feedback, and the diagnostic accuracy and doctors' work efficiency have been greatly

improved. In the future, artificial intelligence technology will bring great changes to the medical field and inject new energy into the biomedical industry.

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