Establishment of Artificial Intelligence Evaluation System in Diagnosis and Treatment Medicine

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Abstract: Since the concept of artificial intelligence was first proposed in 1956, it has evolved and developed for more than 60 years. Driven by new technologies and theories such as supercomputing, big data, mobile Internet and sensor networks, as well as economic and social development, artificial intelligence began to show its skills in all walks of life, showing the characteristics of cross-border integration, man-machine cooperation, autonomous control and in-depth learning. Medical artificial intelligence is the application and development of artificial intelligence technology in medical field. Its applications are mainly reflected in intelligent diagnosis and treatment, intelligent image recognition, intelligent health management, intelligent drug research and development, medical robot and so on. This paper summarizes the application and development status of artificial intelligence diagnosis and treatment platform in the medical field from the aspects of intelligent medication, intelligent image recognition and intelligent health management, puts forward its problems in innovation and social ethics, and summarizes and prospects the future development.

1. Introduction

With the development of scientific research, the application of intelligent diagnosis and treatment system in medicine is gradually increasing. The effectiveness of these systems improves doctors' judgment of disease prediction. Today, when the development of artificial intelligence has become a national strategy, it has become an inevitable trend for the medical and health field to move from informatization to intelligence. The application of medical artificial intelligence has the characteristics of data-driven and rapid iteration. Intelligent computing algorithms play an important role in the applicability of disease diagnosis. The application of Intelligent diagnosis and treatment evaluation system can continuously improve the professional level of doctors, minimize some unnecessary cumbersome and repetitive events in diagnosis and treatment, improve the labor intensity of medical personnel and staff of medical auxiliary institutions, reduce the pain of patients and the burden of medical expenses, and introduce artificial intelligence technology into the medical field.

2. Overview of Artificial Intelligence

Artificial intelligence is a branch of computer science and is also considered to be one of the three cutting-edge technologies in the 21st century. It tries to understand the essence of intelligence and create a new intelligent machine, which can respond in a way similar to human intelligence. The main research contents of artificial intelligence include: knowledge representation, automatic reasoning and search methods, machine learning and knowledge acquisition, knowledge processing system, natural language understanding, computer vision, intelligent robot, automatic programming and expert system. Since the birth of artificial intelligence, its theory and technology have become more and more mature, and its application field has been expanding. It has become a theoretical and practical system. The development of artificial intelligence is closely related to the development of computer science and technology. In addition to computer science, AI also involves many disciplines, such as information theory, cybernetics, automation, bionics, biology, psychology, mathematical logic, linguistics, medicine and philosophy.

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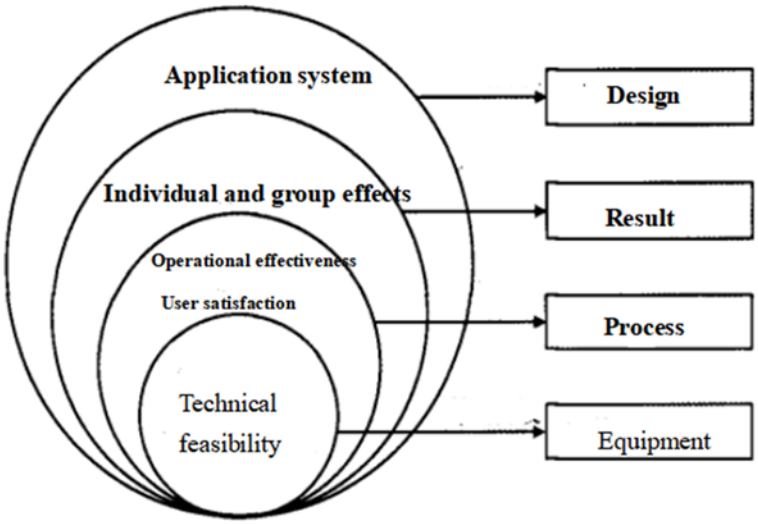

Figure 1 Application evaluation framework of artificial intelligence in diagnosis and treatment medicine.

3. Establishment of Evaluation System

3.1. Foundation framework

The system provides a systematic evaluation basis for the technology applied for entering medical institutions and the reimbursement catalogue of medical insurance approved by the medical device supervision department, tracks and evaluates the post market effect of new technologies entering clinical application, and looks forward to the future technology. The evaluation objectives can be based on a variety of purposes, and can be used to continuously evaluate the application process, guide the application research and development of medical artificial intelligence products, and evaluate the impact of specific applications on the health system. The evaluation results can guide the whole process from product research and development to use, so as to improve product quality and increase the possibility of obtaining expected positive results; It can also point out the risks of using assisted diagnostic and therapeutic medical artificial intelligence to guide and solve these problems(Figure 1).

3.2. Evaluation system access dimension

1) Technical feasibility

It focuses on the accessibility of patients, medical personnel and medical institutions. For the accessibility of patients / medical staff, the time, distance, cost and other resource costs of patients shall be fully considered. In order to obtain / provide medical artificial intelligence services for auxiliary diagnosis and treatment, additional equipment and systems are required, portability and ease of use. The accessibility of medical institutions mainly considers the requirements and costs of additional sites, equipment and systems required by medical institutions to provide services, appointment arrangements and installation / placement location requirements.

2) Operational effectiveness

It focuses on scene matching, ease of use and operation management. Whether the scenario matching is closely combined with the process of the application scenario and whether it is convenient for users to adapt. Ease of use fully considers the simplicity and ease of use, as well as the training or qualification required by users. Operation management is not only the need of correct and safe use management and emergency support supervision and management, but also the difficulty of coordination.

3) User satisfaction

It mainly focuses on user acceptance, doctor-patient experience, usage habits and doctor-patient

roles. Reflect the acceptance or rejection of new concepts, industries and technologies by patients and medical staff. Compared with the traditional way of providing medical services based on the evaluation of user experience, doctor-patient experience focuses on the feelings of doctors and patients. Usage habits reflect the balance between the improvement of service quality and efficiency and the efforts required by users to master usage operations, as well as the mechanism of cultivating usage habits.

4) Individual effect

Focus on patient / clinical effectiveness and medical staff / service effectiveness. Patient / clinical effectiveness reflects changes in patient conditions, including current and possible future changes. The effectiveness of medical staff / services reflects the quality and efficiency of services provided by medical staff and the frequency of adverse events.

5) Group effect

It mainly focuses on the effectiveness, economic and social benefits of the service system. Service system effectiveness refers to the quality and efficiency of medical and health service system. Economic benefit refers to the comparison between resource occupation, cost expenditure and the effect of useful services. Social benefit refers to the extent to which limited resources are used to meet the growing medical and health needs of the people.

3.3. Designing evaluation scheme

1) Defining the purpose of the assessment

The evaluation purpose is determined according to the development stage and application scenario of diagnostic and therapeutic medical artificial intelligence products. For example, analyze the main technical characteristics and clinical application characteristics of diagnosis and treatment medical artificial intelligence products, and provide decision-making basis for decision-makers in terms of pricing, medical insurance payment mode and service organization mode.

2) Refining evaluation indicators

Determine evaluation dimensions and boundaries. Through consulting literature and brainstorming, the evaluation index set is compiled. Then, through the method of expert consultation, we can understand what questions stakeholders think need to be answered in this evaluation and the priority of these questions, so as to select the available evaluation indicators around the evaluation framework.

3) Identifying the human subjects

The users of the evaluation results have a direct impact on the evaluation focus. Their participation enables evaluators to better understand the expected purpose of the evaluation, prioritize objectives and methods, and prevent the evaluation results from being inconsistent with the purpose.

4) Evaluation method

Select according to the evaluation indicators, and determine the types, sources, collection tools, data management, analysis and expression methods of evidence. For example, for the re verification of the accuracy of medical AI diagnosis and treatment, the inspection and evaluation method can be used, the clinical effect analysis can be through the system review method, and the patient satisfaction can be through the expert scoring method.

3.4. Enabling evaluation system

Through examination evaluation, expert scoring and systematic review, systematically evaluate the clinical effect, cost-effectiveness, fairness and impact on the health system of the application of auxiliary diagnosis and treatment medical artificial intelligence, and form the first draft of the evaluation report.

1) Expert evaluation method

According to the artificial intelligence characteristics of diagnosis and treatment medicine, the evaluation indexes are evaluated to form a value-based scoring standard. Employ several representative experts to give the evaluation scores of each project according to this evaluation standard according to their personal experience, and then collect.

2) Examination evaluation method

To test the accuracy of the application of medical artificial intelligence in auxiliary diagnosis and treatment. It is suggested that the National Medical Laboratory Center compile a test question bank, extract the test questions, review the test questions by 3 or 5 clinicians with senior professional titles, and score the possible answers, so as to calculate the performance of auxiliary diagnosis and treatment of medical AI application.

3) Systematic review method

Using the central word to collect and search the relevant literature at home and abroad, analyze the application, cost information, distribution, payment, clinical safety and effectiveness, and health economic evaluation of auxiliary diagnosis and treatment medical artificial intelligence at home and abroad.

4) Conclusion evaluation results

The evaluation working group organizes multi-party meetings to explain and discuss the evaluation results, form final suggestions, and generate the final formal evaluation report to ensure the sharing and use of the evaluation results.

Figure 2 Application of artificial intelligence in diagnosis and treatment medicine.

4. Issues and challenges

There is uncertainty in the development of artificial intelligence. If it is allowed to develop, it will expand the possibility of potential risks of technology. Therefore, we must take a cautious attitude, give priority to active guidance and supplemented by prevention and supervision, so as to ensure the safety and order of the application of artificial intelligence technology. The establishment of the application evaluation system of artificial intelligence in diagnosis and treatment medicine will effectively promote the construction of the whole life cycle supervision system of medical artificial intelligence, gradually improve the mode of combining production, learning, research and application led by the government and guided by health needs, guide and guide the research and development of relevant artificial intelligence technologies, and avoid the Red areas with serious technical risks; Strengthen the research on antagonistic learning algorithms, reduce the hidden dangers of the development of artificial intelligence, and further promote the rational, effective and safe application of medical artificial intelligence technology.

5. Conclusion

Diagnosing diseases is one of the most difficult tasks in clinical medicine. The clinician may endanger the patient’s life because of the wrong diagnosis. The realization of Intelligent diagnosis and treatment evaluation system has made great changes in predictive physical examination and has been widely used in the field of medicine. The platform will have the advantages of hierarchical clustering and random decision-making, such as enhancing the prediction results by generating smaller clusters, consistency of clustering results in different algorithm operations, accurate learning, estimation of key variables, accurate calculation of approximate values between cases, and

unnecessary a priori information about the number of clusters. The synthesis method shows the ability to improve complex medical treatment and decision-making through clustering data. Intelligent diagnosis and treatment will be the development direction and trend of human medical treatment in the future. We will wait and see if it can replace doctors in medicine. However, I believe that AI will help doctors to relieve medical pressure in some aspects, improve the quality of medical services, and promote the continuous development and progress of medicine. On the premise of continuous innovation and improvement, it will treat and accept medicine with a positive attitude, and the rational use of Intelligent diagnosis and treatment evaluation system will become a favorable tool for clinicians to assist in diagnosis and treatment.

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