

Understanding and Research of Computer Artificial Intelligence on Medical Care

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Abstract: *The research and application of computer artificial intelligence in the medical field is increasingly becoming a focus of attention. This article delves into the extensive applications of AI in medical understanding and research, as well as the challenges and prospects it faces. From medical image recognition, natural language processing to epidemic prediction, AI has shown tremendous potential. However, challenges such as data security, privacy protection, and ethical issues also arise. However, with the continuous advancement of technology, AI is expected to provide more personalized solutions in disease prevention, diagnosis, treatment, and bring revolutionary changes to the medical field.*

Keywords: Computer artificial intelligence; Medical care; Acquaintance; Study.

1. INTRODUCTION

The application of computer artificial intelligence in the medical field is a topic full of potential and change. Artificial intelligence technology is changing our understanding of healthcare in unprecedented ways, providing new means for disease prevention, diagnosis, and treatment. From medical image recognition, natural language processing to epidemic prediction, the application of artificial intelligence continues to expand, bringing tremendous changes to the medical field. However, artificial intelligence also faces many challenges in medical applications, such as data security and privacy protection, ethical issues, and so on. Therefore, when promoting the application of artificial intelligence in the medical field, we need to fully consider these factors to ensure the healthy development of technology.

2. THE APPLICATION OF COMPUTER ARTIFICIAL INTELLIGENCE IN MEDICAL UNDERSTANDING

With the rapid development of computer artificial intelligence (AI), its application in the medical field is becoming increasingly widespread. In terms of medical awareness, AI technology plays a crucial role, not only improving the efficiency and quality of medical services, but also providing new means for disease diagnosis, treatment, and prevention. The following are several main application directions of AI in medical cognition.

2.1 Medical Image Recognition

Medical image recognition is one of the most mature applications of AI in the medical field. Through methods such as image classification and recognition, lesion detection and localization, and the establishment and optimization of medical imaging databases, AI has demonstrated powerful capabilities in medical image recognition. Image classification and recognition are the fundamental applications of medical image recognition. By classifying and recognizing medical images, AI can automatically determine the type and location of lesions, providing doctors with accurate diagnostic criteria. For example, using deep learning algorithms to classify and recognize images such as X-rays, CT, and MRI can quickly and accurately detect lung nodules, tumors, and other lesions. Disease detection and localization are further deepening applications of medical imaging recognition. By using AI technology to automatically analyze and process medical images, doctors can more accurately detect and locate lesions. This helps to improve the accuracy and efficiency of diagnosis, and reduce the occurrence of missed and misdiagnosed cases. For example, in the diagnosis of breast cancer, AI technology can be used to more accurately detect the location and shape of breast masses, assisting doctors to make more accurate pathological diagnosis. The establishment and optimization of medical imaging databases are important foundations for achieving medical image recognition. Through the collection, annotation, and processing of large-scale medical imaging data, AI can continuously learn and optimize, improving the accuracy and reliability of diagnosis. At the same time, the establishment of medical imaging databases also helps doctors share and exchange case information, improving the level of medical services.

2.2 Application of Natural Language Processing in Medical Text Analysis

Medical text analysis is another important application of AI in the medical field. By using natural language processing technology to extract information from medical texts, establish disease prediction models, and construct medical knowledge graphs, AI can provide more comprehensive and in-depth medical information support. Medical record text information extraction is the fundamental application of natural language processing in medical text analysis. By performing natural language processing and analysis on medical record texts, AI can automatically extract information such as patients' medical history, symptoms, diagnosis, and treatment plans, providing doctors with fast and accurate diagnosis and treatment references. This helps to improve doctors' work efficiency and reduce the risk of missed diagnosis and misdiagnosis. The establishment of disease prediction models is a further deepening application of natural language processing. By analyzing a large amount of medical record text data, AI can uncover the relationship between diseases and individual patient characteristics, and construct predictive models. This helps doctors predict disease risks and treatment outcomes in advance, and develop more scientific and reasonable diagnosis and treatment plans. For example, according to the patient's electronic health record (EHR) data, AI can predict the blood sugar control of diabetes patients and take intervention measures in advance to reduce the risk of complications. The construction of a medical knowledge graph is the application of AI to practical medical text analysis. By extracting and organizing massive amounts of information in the medical field, AI can construct a massive knowledge graph network, providing comprehensive, accurate, and timely medical information support. This helps doctors quickly find and obtain the necessary knowledge and information, improving the quality and efficiency of diagnosis and treatment. Meanwhile, the construction of a medical knowledge graph also contributes to the development of medical research and education.

2.3 The role of artificial intelligence in epidemic prediction and control

AI has also demonstrated powerful capabilities in epidemic prediction and control. By collecting and analyzing epidemic data, establishing and optimizing prediction models, and formulating and implementing prevention and control strategies, AI provides scientific basis for governments and medical institutions to develop effective prevention and control measures. The collection and analysis of epidemic data is the fundamental application of AI in epidemic prediction and control. By collecting a large amount of epidemic related data (such as number of cases, deaths, population movements, etc.), AI can conduct real-time monitoring and analysis, and timely discover the trend and transmission path of epidemic outbreaks. This helps the government and medical institutions to provide early warning and take effective measures to control the spread of the epidemic. The establishment and optimization of predictive models are based on simulating and predicting the transmission path and development trend of epidemics using historical data and current conditions. By utilizing machine learning and statistical modeling techniques, AI can conduct in-depth analysis and mining of epidemic data, establish predictive models, and continuously optimize their accuracy. This helps the government and medical institutions to formulate prevention and control strategies and resource allocation plans in advance, reducing the harm of the epidemic to society. The formulation and implementation of prevention and control strategies is the process of developing and implementing prevention and control strategies based on the recommendations of predictive models and epidemic data. By comprehensively analyzing factors such as epidemic data, population mobility, and socio-economic factors, AI can provide scientific and reasonable prevention and control strategy recommendations for governments and medical institutions. This helps to reduce the impact of the epidemic on society and the economy, and safeguard people's life safety and physical health.

3. THE APPLICATION OF COMPUTER ARTIFICIAL INTELLIGENCE IN MEDICAL RESEARCH

With the rapid development of technology, the application of computer artificial intelligence (AI) in the medical field is becoming increasingly widespread, bringing revolutionary changes to medical research. AI has not only changed our understanding of healthcare, but also provided new means for the diagnosis, treatment, and prevention of diseases. In medical research, the application of AI is mainly reflected in the design of clinical trials, the development of personalized medical plans, and the optimization of new drug research and production.

3.1 Clinical trial design

Clinical trials are a crucial aspect of medical research, and the application of AI has brought new possibilities for clinical trial design.

Firstly, data filtering and preprocessing are the fundamental applications of AI in clinical trial design. The traditional clinical trial data screening process is cumbersome and prone to errors, while AI can quickly and accurately screen valuable data through technologies such as natural language processing and machine learning. By analyzing a large amount of clinical data, AI can help researchers screen out meaningful indicators and variables, providing a basis for subsequent trials. In addition, AI can also preprocess data, such as filling missing values and detecting outliers, to improve the quality and reliability of the data.

Secondly, experimental design and simulation are also important application directions for AI. Traditional clinical trial design often relies on experience and personal judgment, while AI can provide more scientific and objective basis for trial design by simulating the trial process and predicting results. For example, using machine learning algorithms, AI can train and learn from historical data, and then make model predictions and optimize experimental design schemes based on the purpose and requirements of the experiment. In addition, AI can refine grouping and matching based on individual differences and disease characteristics of patients, improving the pertinence and effectiveness of trials.

Finally, the analysis and interpretation of the results is a further deepening application of AI in clinical trial design [2]. Traditionally, the analysis of clinical trial results has relied on statistical methods, but these methods often require specialized knowledge and are prone to errors. AI can automatically analyze experimental data and provide accurate conclusions and recommendations through technologies such as deep learning and image recognition. For example, by using deep learning algorithms to analyze medical images, AI can automatically detect the location and size of lesions, and predict and evaluate the condition based on the data. This can not only improve the efficiency and accuracy of data analysis, but also provide researchers with more comprehensive and in-depth insights.

3.2 Development of Personalized Medical Plans

Personalized medicine is the development of targeted treatment plans based on individual differences of patients, and the application of AI provides strong support for the development of personalized medicine plans. Firstly, genomic analysis and application are fundamental applications. Genomics research is closely related to personalized medicine. Through in-depth analysis of patients' genomic data, information such as disease risk and drug response can be predicted. Using AI technology for genomic data analysis can accelerate the research process and improve prediction accuracy. By comparing and analyzing the genetic sequences of patients, AI can identify genetic variations related to diseases or drug responses, providing personalized diagnosis and treatment recommendations for doctors. This helps to achieve more precise and effective personalized medical solutions. Secondly, personalized drug response prediction is also an important application of AI in the development of personalized medical plans. Drug reactions vary among individuals, and AI technology can be used to predict patients' reactions to specific drugs. By comprehensively analyzing the patient's genome, phenotype, and past treatment information, AI can predict the patient's response to drug metabolism, efficacy, and side effects. This helps doctors choose the most appropriate treatment plan, reducing unnecessary drug trials and the occurrence of side effects. Finally, the implementation of personalized healthcare strategies involves applying AI to actual personalized healthcare processes. After comprehensive analysis of patient information using AI technology, doctors can develop diagnosis and treatment plans that best match the individual characteristics of the patient. In clinical practice, this can improve treatment efficacy and patients' quality of life. In addition, adjusting the diagnosis and treatment plan by tracking changes in the patient's condition and evaluating treatment effectiveness can further improve the effectiveness of personalized medicine [3].

3.3 New drug development and production optimization

New drug development is a long and complex process, and the application of AI has brought new breakthroughs to new drug development and production optimization. Firstly, drug activity prediction and screening are fundamental applications. Drug activity prediction is one of the key steps in new drug development, which involves the screening and evaluation process of a large number of candidate drugs. The use of AI technology for drug activity prediction can greatly accelerate this process and improve the accuracy of screening. Through techniques such as deep learning and molecular simulation, AI can simulate and analyze the interactions between

candidate drugs and targets, predict drug activity and efficacy. This helps to quickly screen potential candidate drugs and prioritize their development. Secondly, intelligent management of production processes is also one of the important application directions of AI in new drug research and production optimization. The development of new drugs not only involves laboratory research but also requires the coordination and optimization of industrial production processes. The use of AI technology for intelligent management of production processes can improve production efficiency and quality while reducing costs and risks. Real time data collection, analysis, and prediction through the monitoring and management system of intelligent production lines can achieve refined production control and quality assurance. This helps to improve the reliability and consistency of drug production, ensuring the success of new drug development and the effectiveness of market launch. Finally, the application direction of cost control and market forecasting in new drug research and development. New drug development is a high-risk, high investment process that requires full consideration of costs and market factors to achieve sustainable development. The use of AI technology can provide decision support for refined budgeting and resource allocation, helping pharmaceutical companies better control costs and improve efficiency. At the same time, market analysis and forecasting can assist in the formulation and execution of marketing strategies for new drugs after they are launched, adjusting research and development directions based on market feedback to better meet market demand and promote business development. In short, through these applications, artificial intelligence can not only accelerate the process of new drug development, reduce costs, and improve efficiency, but also provide decision support for drug production and market launch. However, in the application process, it is also necessary to pay attention to challenges such as data security, privacy protection, and ethical issues. Therefore, when promoting the application of AI in medical research, it is necessary to fully consider these factors to ensure the healthy development of the technology.

4. CHALLENGES AND PROSPECTS OF COMPUTER ARTIFICIAL INTELLIGENCE IN THE MEDICAL FIELD

With the widespread application of computer artificial intelligence in the medical field, a series of challenges and problems have also emerged. Among them, the challenges of data security and privacy protection are particularly prominent. In the medical field, patients' personal information and health data are highly sensitive, and once leaked or improperly used, they may cause significant harm to patients. Therefore, how to ensure data security and privacy while utilizing AI technology has become an urgent problem to be solved. Policymakers and researchers need to establish stricter data protection policies, strengthen regulation of data access, and develop more powerful data encryption technologies to ensure the security of patient information. Another challenge comes from the ethical issues of artificial intelligence. The role of AI in medical decision-making is becoming increasingly important, such as diagnosing diseases and recommending treatment plans. However, if these decisions are based on unfair, biased, or incorrect datasets, they may infringe upon the rights of patients. Therefore, ethical issues are an indispensable part of the development of AI in the medical field. For this issue, it is necessary to establish relevant ethical review mechanisms to ensure the fairness and transparency of AI technology. At the same time, researchers also need to delve into the principles and processes of AI decision-making to enhance public trust in AI. Despite these challenges, the future prospects of computer artificial intelligence in the medical field remain vast. With the continuous advancement of technology, AI will be able to better understand and simulate complex biological processes, providing more possibilities for disease prevention, diagnosis, and treatment. For example, more accurate disease prediction models can help doctors provide early warning and develop personalized treatment plans; AI driven intelligent healthcare systems can assist doctors in making more efficient clinical decisions; AI can also be used for optimizing new drug development and production processes, reducing costs and improving efficiency. Policy recommendations and research directions are particularly important for these possible development directions. The government should increase investment in the field of AI healthcare and encourage research institutions and enterprises to engage in technological innovation; Develop and improve relevant regulations to standardize the application and development of AI in the medical field; Establish interdisciplinary research teams to address the complex issues faced by AI in the healthcare field; Strengthen education and publicity for the public to increase their awareness and acceptance of AI healthcare.

5. CONCLUSION

In the exploration of the understanding and research of computer artificial intelligence on healthcare, we have gained a deep understanding of the widespread application of AI in the medical field and the revolutionary changes it brings to healthcare. However, with the rapid development of technology, we should also be vigilant about the challenges that come with it, such as data security and privacy protection, ethical issues, and so on.

Looking ahead, we have reason to believe that by overcoming these challenges, computer artificial intelligence will unleash greater potential in the medical field and make greater contributions to human health. This is a field full of infinite possibilities and expectations, worthy of further in-depth research and practice.

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