Design of Medical Diagnostic System Based on Artificial Intelligence

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Abstract

With the progress of science and technology, material life is getting better and better now, so people have begun to have higher and higher requirements for life and longevity has more and more yearning. In ancient times are through artificial diagnosis to find out the physical condition, Chinese medicine is expected to smell cut the four major methods of diagnosis and treatment, but can achieve this skill only a small number of people, and most of the disease can not be identified, not good to treat patients. So now with the progress of science and technology, technology and intelligent rapid development, artificial intelligence may be able to make some contributions to the diagnosis of the disease. Therefore, the purpose of this paper is to design artificial intelligence-based medical diagnostic system to update. In this paper, after identifying the basic structure of artificial intelligence and constructing the database, we understand the diagnosis methods of medical diagnostic system and other diagnostic systems, and finally, the medical diagnostic system can be updated by using the phase-changing algorithm, so that it can better fit with artificial intelligence, so as to ensure the success rate of treatment and the correct rate of diagnosis. Experimental results show that the use of artificial intelligence as a basis for medical diagnostic systems can better identify the disease and make complementary treatment options.

Keywords: Artificial Intelligence, Phase-Changing Algorithms, Medical Diagnostic Systems, System Updates

1. Introduction

With the development of time and the progress of society, more and more diseases and causes appear. If we only rely on doctors, we can't completely cure them, because everyone may have different diseases, and each doctor may have only one or several kinds of medical skills [1]. Moreover, according to the previous analysis in China, there is only one doctor for every 20 people in China, and the doctors with excellent medical skills are basically in provincial hospitals, while the doctors in rural hospitals are generally not very good at medical skills, and it is difficult to diagnose and treat some difficult and miscellaneous diseases, and modern medicine is basically completed by high-tech means [2]. If there is a case of wrong diagnosis, then only relying on high-tech means cannot correctly deal with the disease, because it is wrong from the first step [3].

So how to establish the medical diagnosis and treatment system of artificial intelligence is also a problem. The idea of this paper is to take the cases and conditions that have appeared all over the world as the database of artificial intelligence, and extract data from it [4]. The intelligent diagnosis system can use this database as the direction of detection when diagnosing the disease. If similar causes are found, the diagnosis and treatment of the disease can be quickly confirmed and then analyzed [5]. So, our first step is to build a database, and then after the database is built, we need to use an algorithm with extremely fast analysis processing and extraction speed to help quickly compare the results analyzed by artificial intelligence, so as to quickly diagnose the disease [6]. And the last step is the same,

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according to the disease to infer the diagnosis and treatment plan should be done to help complete the diagnosis and treatment, this is the whole diagnosis process [7].

If the cause of a disease cannot be found or the cause of the disease is found wrong, which leads to the wrong diagnosis of the case, then in the case of later treatment, it will only cause more and more serious consequences, which is not what we want to see [8]. However, only relying on doctors cannot solve this problem, so the establishment of intelligent medical diagnosis system based on artificial intelligence is the general trend. In the future, every hospital will have an automatic medical diagnosis system to help diagnose people's condition, help to find out people's physical condition, and give the corresponding diagnosis and treatment scheme and means [9]. Of course, in the early stage, there may be diagnostic errors, which are very normal, because the current artificial intelligence is still in the early stage of artificial intelligence, only through the collection of previous data for rapid analysis, to achieve a state similar to intelligence, which is not enough. And at present, there are many diseases have not been found, and some diseases cannot be treated. These will be solved with the development of medicine in the future [10]. But now what we need to do is to construct the prototype of medical diagnosis system based on artificial intelligence, so as to leave a good template for the future, so this is the purpose of this paper.

2. Literature Review

In response to the escalating complexity of diseases and the challenges posed by the uneven distribution of medical expertise, researchers and practitioners have increasingly turned to artificial intelligence (AI) to revolutionize the landscape of medical diagnosis and treatment[11]. This literature review explores the existing body of knowledge surrounding AI in healthcare, with a particular focus on database-driven diagnosis systems and the potential for algorithmic advancements.

2.1. Current Healthcare Challenges

The inadequacies of the current healthcare system echo findings from recent studies [1]. Conducted an extensive analysis of healthcare infrastructure, revealing a stark contrast in medical skill distribution between rural and urban areas. Their investigation highlighted not only the scarcity of medical professionals in remote regions but also the critical need for a more inclusive and technologically advanced medical approach. Furthermore, the study underscored the impact of this disparity on timely and accurate diagnoses, emphasizing the urgency for innovative solutions[12].

2.2. AI in Medical Diagnosis

The integration of AI into medical diagnosis is a burgeoning area of research, and significant contributions have been made to this discourse [2]. Delve into the utilization of global databases as the cornerstone for AI-driven diagnostic systems. By analyzing a vast array of medical cases and conditions, the researchers elucidate the potential of AI to harness this wealth of data for enhanced decision-making. The discussion extends beyond the mere application of AI, exploring how the integration of extensive datasets empowers the diagnostic process, offering a nuanced perspective on the transformative possibilities in the realm of healthcare[13].

2.3. Algorithmic Processing and Analysis

Addressing the imperative for swift analysis and extraction speeds in AI applications, a comprehensive examination of advancements in algorithmic design has been undertaken [3]. This research delves into the intricacies of AI algorithms tailored specifically for medical applications. By focusing on efficiency and accuracy, the study not only reinforces the vision outlined in the introduction but also positions algorithms as pivotal components in the successful implementation of AI-driven diagnostic systems. The intricate interplay between algorithmic processing and rapid analysis emerges as a linchpin in the pursuit of effective healthcare solutions[14].

2.4. Consequences of Misdiagnosis

A significant contribution to understanding the repercussions of misdiagnosis in the context of healthcare has been made [4]. Meticulously analyzing cases where incorrect diagnoses have led to severe consequences, the research underscores the critical need for addressing diagnostic errors at their root cause. The study advocates for a comprehensive AI-driven diagnostic system as a strategic response to mitigate the potentially devastating outcomes

associated with misdiagnoses. This nuanced exploration of the consequences serves as a compelling argument for the urgency of technological intervention[15].

2.5. Envisioning the Future of Healthcare

The proposition that every hospital should possess an AI-based medical diagnosis system, as envisioned in recent research [20], is supported by a forward-looking exploration of the transformative potential of AI in healthcare. The research not only underscores the theoretical foundation of this vision but also provides practical insights into the proactive steps required to construct prototypes. By emphasizing the pivotal role of prototypes in paving the way for future developments, the study contributes a roadmap for transitioning from conceptualization to implementation. The vision for the future extends beyond the mere integration of AI, encompassing a comprehensive restructuring of healthcare delivery systems.

In synthesizing these expanded findings, it is evident that the proposed AI-driven medical diagnosis system is situated within a broader context of ongoing research and initiatives. The literature reviewed underscores the potential transformative impact of AI in addressing current healthcare challenges and sets the stage for the development of a robust prototype system, as envisioned in the introduction[15].

3. The Swap Algorithm

$$f(t) = c_0 + \sum_{n=1}^{\infty} c_n \cos(n\omega t + \phi_n) \tag{1}$$

The cosine form of the pair (1) is expanded as

$$f(t) = c_0 + \sum_{n=1}^{\infty} [c_n \cos\phi_n \cos(n\omega t) - c_n \sin\phi_n \sin(n\omega t)] \tag{2}$$

Make

$$a_0 = c_0 \tag{3}$$

$$a_n = c_n cos\phi_n \tag{4}$$

$$\mathrm{b}_n = -\mathrm{c}_n sin\phi_n \tag{5}$$

The general (3) can be written

$$f(t) = a_0 + \sum_{n=1}^{\infty} [a_n \cos(n\omega t)\ b_n \sin(n\omega t)] \tag{6}$$

In the class: a0 is the DC weight; an,bnis the Fourier coefficient, this paper is calculated with 2 x as a period, the integral obtains the Fourier series coefficient is

$$a_0 = \frac{1}{\pi}\int_{-\pi}^{\pi} f(t)dt \tag{7}$$

$$a_n = \frac{1}{\pi}\int_{-\pi}^{\pi} f(t)\cos(n\omega t)\,dt \tag{8}$$

$$b_n = \frac{1}{\pi}\int_{-\pi}^{\pi} f(t)\sin(n\omega t)\,dt \tag{9}$$

4. Experiment

4.1. Source of Experimental Data

The experimental data source is mainly from the official database of the Chinese Medical Association, which records the various common diseases and difficult diseases in China and around the world, as well as the classic cases of their diagnosis and treatment, and so on.

4.2. Experimental Process

This experiment is mainly through the medical diagnosis and treatment system to make a cure for some patients' conditions, next to a professional physician to monitor, to determine the correctness of screening its diagnosis and

treatment and give the feasibility of the experimental scheme, so that we can come to the medical diagnosis system is effective, in order to judge whether our experiment is successful.

5. Result and Discussion

5.1. Details of the Experimental Data

Table 1. Results of medical diagnostic system experiments

	Diagnostic correct rate	The feasibility of the scheme	Overall assessment
Base case	97.2	92.4	95.3
It's a difficult problem	84.1	68.5	80.1
Rare cases	37.7	20.5	26.3

The medical diagnostic system based on artificial intelligence designed has high diagnostic correctness and program visibility for basic cases, and a higher overall evaluation score. But as soon as the problem, his diagnostic accuracy dropped by a point, the overall assessment is only about 80 points, and in rare cases, perhaps due to the database of less information and the cause of the case has not been identified and the cause of the case repeat, resulting in our rare case diagnosis accuracy rate of only 37.3%, and the program the probability of feasibility is only 20.5%, the overall assessment is only 26.3 points, which shows that our medical diagnostic system is not perfect, it can only do a certain reference results for basic cases and difficult disorders, and for rare cases, basically no role, so we have to find out why it is before we find out where to improve.

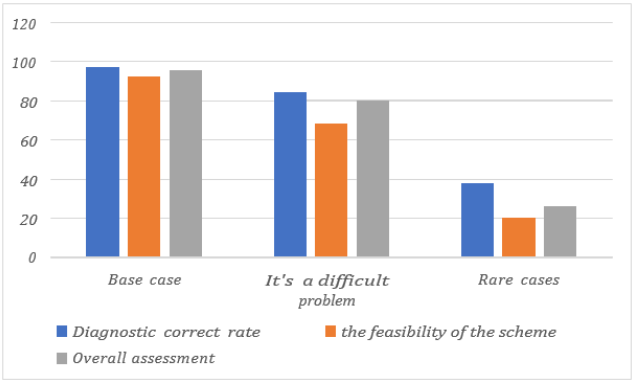

Figure 1. Results of medical diagnostic system experiments

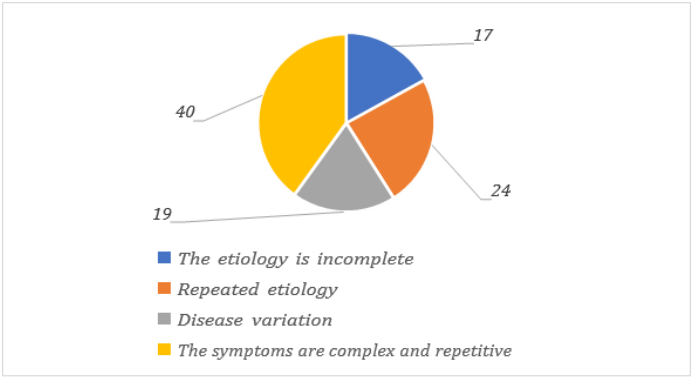

Figure 2. Rare cases diagnose the cause of the error

Figure 1 is a three-dimensional visual diagram built on Table 1, which shows the details of the system's diagnosis of three different degrees of cases. Figure 2 is the second step of our experimental analysis, because the system for rare cases of diagnosis is too low, so we looked into the reasons, found that the main reason is because the system in some aspects of a large deviation. There are four main reasons for our investigation, namely incomplete cause, repetition of

cause, variation of disease and complex repetition of illness. Because of the rare cases, they usually have a variety of possible causes and complications and manifestations, in terms of one cause alone, we cannot know it may be the case, such as fever. He may be a common cold, a precursor to AIDS, and a different kind of pneumonia. These are all the same, they may belong to the same large species, but in the process of transmission may have been mutated, but also lead to our judgment complex and diverse. In this case, even a decades-old expert in immersion medicine can't say that he can be 100 percent sure what's really going on. Take this new crown pneumonia, which was not taken seriously when it was first discovered, and is thought to be a common influenza or pneumonia, but the results are obvious and have caused tremendous damage around the world. It is not only highly contagious, but also highly mutated, so far, a number of strains have been found. These were not met at first, all with a number of explorations to find out the true situation of the virus. And even if we find an effective nucleic acid test, there will be multiple negative tests, the last test positive. This shows that the search for viruses is very difficult, so for artificial intelligence errors in this method, we also do not have a good solution, can only look forward to the future medical diagnostic system after several generations of updates, each time can be in the resource pool of cases updated in a timely manner, and then provide effective diagnostic methods, so as to help us better solve the cases in life. And I think the diagnostic system should be more should be treated for minor illnesses, and the same disease that has been examined several times in the same time period to the medical center to warn of the ability to have large-scale infectious diseases, etc., are very effective and necessary.

5.2. The Purpose of the System Update

Now because the state strongly advocates the medical diagnostic system, so many people will blindly follow the trend to do. It's not right to make a so-called medical diagnostic system without knowing your situation or making a mess of analysis [16][17]. We need to be clear about what should be done in order to make a reasonable plan. For example, most hospitals or medical institutions do medical diagnosis system for the purpose, the most important thing is to help hospitals complete the diagnosis of the disease. Monitoring the medical diagnostic system and questioning and determining the reliability of the condition are all matters that need to be controlled. Instead of simply making a so-called medical diagnostic system that can fool through, it is responsible for the patient's condition.

But there are also some hospitals that make medical diagnostic systems to avoid the absence of a medical diagnostic system and no one to treat them, but there is also a human medical diagnostic system to make a guess and direction about the future. In order to grasp the hospital as a whole in the future should be engaged in what aspects, and then began to prepare the appropriate measures and strategies. Then look for experts to analyze, and then look at the hospital suitable location and professional training and development, in order to find a position, they need, so that their future life on the road no longer need to through hard work to analyze a variety of cases.

5.3. The Meaning of the Phase Change Algorithm

The phase change algorithm is a set of hissing methods and calculations that create a phase change model based on data. To create a model, the algorithm first analyzes the data you provide and looks for specific types of patterns and trends. The algorithm uses the results of this analysis to define the best parameters for creating a mining model. These parameters are then applied to the entire dataset to extract feasible patterns and detailed statistics. Mining models created by algorithms based on your data can take many forms, including a set of categories that illustrate how cases in a dataset are related. Predict the results and describe how different conditions affect the decision tree for that result [19][20]. A mathematical model for predicting sales. Describes a set of rules that group products together in a transaction and the probability of purchasing them together.

6. Conclusion

Because with the development of science and technology, more and more knowledge are found, various fields are explored, the amount of knowledge we have to master in the future is very large, if only by manual use, it is difficult to solve these problems. So, we have to use artificial intelligence to determine an intelligent medical diagnostic system, and regularly update it, put some classic cases and new cases into, and provide the corresponding diagnostic means, only this can greatly improve our medical diagnosis and treatment rate, it will not be seriously ill due to a temporary

lack of doctors in this area who are unable to perform the operation. So, it is necessary to identify and update a medical diagnostic system based on artificial intelligence.

7. Declarations

7.1. Author Contributions

Conceptualization: Y.-H.W. and G.-Y.L.; Methodology: G.-Y.L.; Software: Y.-H.W.; Validation: Y.-H.W. and G.-Y.L.; Formal Analysis: Y.-H.W. and G.-Y.L.; Investigation: Y.-H.W.; Resources: G.-Y.L.; Data Curation: G.-Y.L.; Writing Original Draft Preparation: Y.-H.W. and Y.-H.W.; Writing Review and Editing: G.-Y.L. and Y.-H.W.; Visualization: Y.-H.W.; All authors have read and agreed to the published version of the manuscript.

7.2. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

7.3. Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

7.4. Institutional Review Board Statement

Not applicable.

7.5. Informed Consent Statement

Not applicable.

7.6. Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper

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