Visual Analysis of the Application of Artificial Intelligence in Medical Field

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Abstract: Under the background of the rapid development of artificial intelligence in contemporary society, the combination of artificial intelligence and the medical field is becoming closer and closer, and the research and application of the medical field are more and more extensive. In the process, many scholars and experts have made a lot of research and development in the medical field and artificial intelligence. To understand the general situation of artificial intelligence application in the medical field under modern science and technology, we selected the literature data of the CNKI database 1996-2018 related to artificial intelligence application in the medical field as the related research object. Then, using CiteSpace visual analysis software to draw the common and cluster map of keywords, analyze the research hotspot and frontier of combining with sudden variation detection, and explore the application of artificial intelligence in medicine and its professional achievements.

Keywords: artificial intelligence, visual analysis

1. Introduction

The concept of artificial intelligence as a relative standard in modern times came from the Dermashian Conference in 1956. After more than 60 years of development, the awareness of the artificial intelligence industry has been changing with each passing day, but there is still a lack of correct and generally accepted definitions. Among them, the National Observatory artificial intelligence is an organization dedicated to making machines intelligent and intelligent. Knowledge refers to the intelligence itself in its environment to play his ability and make corresponding judgments. Starting from the automation of auxiliary surgery and nursing, in order to help clinical practice proceed smoothly, patient monitoring and guidance, complex algorithms will be prepared in advance to extract important information from medical big data and apply it. In addition, the aim is to achieve health risk warning and health performance prediction by extracting useful information from patients' big data. As a research content to obtain the medical field artificial intelligence application-related the CNKI database 1996-2018 literature data. Furthermore, to investigate the overall progress of artificial intelligence applications in the medical field, combined with the sudden variation discovery and time zone mapping in the experiment, in order to understand the hot research topics in the present society, Data are depicted by visual analysis software CiteSpace knowledge mapping.

2. Research methodology

The data used in this study are the CNKI selected journals as the main search source in the database, the database of medical institutions and doctors, and the "medicine" or "medicine" in the subject field in the advanced search box and the related paper of searching artificial intelligence. The search period is from February 28 1998 to February 28 2018.

3. Research process

3.1 Trends in communications

The number of published papers reflects the absolute output of scientific research and is a relatively important index for measuring scientific research activities. From figure 1, the number of published papers on the application of artificial intelligence in the field of medicine will change from time to time under different backgrounds, but for the general situation, This field has been a hot topic concerned and discussed by many scholars. Against the background of the rapid increase in the number of papers

issued from 2015 to 2017, we can see that this field has become the focus of various studies. At the same time, the growth of papers published at this stage may also be related to national policy. In July 2015, artificial intelligence became the focus of research
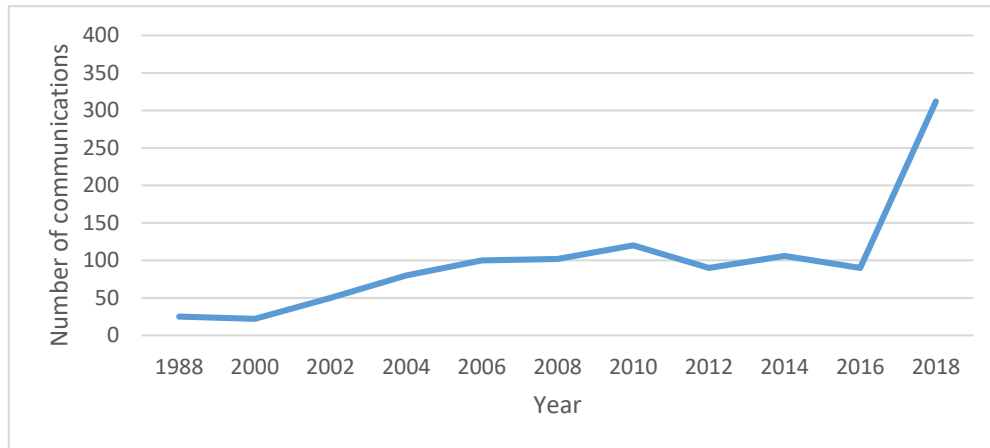

Figure 1 Number of papers on artificial intelligence in medical research

This is an effective part of the positive strategy of the Internet, in the guidance of the State Council written to actively promote the Internet network data voice action.

In 2016, we introduced the three-year action plan of "Internet +" artificial intelligence, the 13th five-year plan" National Science and Technology Innovation Plan "and the corresponding content measures.

In 2017, the national conference issued a notice on a new generation of artificial intelligence display plans. The release of a series of documents shows that China's attention to artificial intelligence is increasing, and suggests the necessity of artificial intelligence in the medical field and a series of requirements and prospects for the development of artificial intelligence in the medical field.

3.2 Keyword Hotspot Analysis

Keywords are very common in describing the subject of the article. They are often used to determine hot topics in the object field. According to the papers published from 1998 to 2018, the author selected the top 50 keywords with the highest frequency per year, during which time in the medical field and artificial intelligence-related research hotspots.

Each node in the chart represents the keyword. The size of the circle represents the frequency of keywords. The nodes around the purple circle show that this topic is an important node in the research field (turning point): this topic shows that the node of the research is important in the research field, as shown in Table 1.

Table 1 Research hotspot of artificial intelligence in medical field

Serial number	High-frequency words	Frequency
1	Artificial intelligence	190
2	Robot	87
3	Expert system	35
4	Semantic Network	16
5	Big data	14
6	AI	11
7	Medical imaging	9
8	Medical Artificial Intelligence	8
9	Neural networks	8
10	Traditional Chinese Medicine	8

Table 1 shows that the knowledge graph produces 100 nodes and 215 connections, and the network density is 0.05. The whole network is relatively loose and the density is not high enough, so there are relatively few concentrated research topics. By combining with the high-frequency keyword node circle, the research situation of "robot" and "expert system" related fields of artificial intelligence in the medical field can be judged in advance.

In the research content of "medical image" and "traditional Chinese medicine ", the application of artificial intelligence in" meaning network "and" neural network "of artificial intelligence algorithm

was a hot topic at that time. At the same time, the keywords of "medical" and "medicine" can be removed by combining with the peripheral color of the ring. The application of artificial intelligence in the robot, medical health, and traditional Chinese medicine is an important node, and these three fields are more important new topics.

3.3 Key word clustering analysis

When we select more than 10 clusters at the same time. If you want to obtain keyword-related clustering maps, add topics to cluster topics to achieve the corresponding results. Cluster analysis can better show the main research areas of artificial intelligence in each research category. The color of the cluster block represents the meaning indicating the year in which the cluster first appears. The blue block is faster than the green block, the yellow block is slower than the green block. The earlier green block is the "expert system ", which indicates that the application of artificial intelligence in medical expert systems forms clustering more than before. In recent years, there have been some studies on the application of artificial intelligence in hierarchical diagnosis and treatment, which indicates the formation of topic aggregation. Combined with Table 2, the main research areas are as follows:

Robot field: the main focus of the research is spinal endoscopy and image diagnosis, the treatment of trigeminal neuralgia, and the role of robot support in auxiliary surgery to achieve medical purposes.

In the field of expert system, the emphasis is on the implementation of medical expert system design and the application mode of method to assist the related application of medical treatment.

Application: the research focuses on medical diagnosis, traditional Chinese medicine, pathology, and other artificial intelligence applications, which represents the application of artificial intelligence application of medical big data and practical precision medicine combination and related applications.

Application of artificial intelligence (AI) field. This clustering shows that artificial intelligence, especially the mechanical learning method of deep learning, begins to explore its application in the medical field.

Stratified diagnosis and treatment: the application and function of artificial intelligence technology in stratified diagnosis and treatment in medicine are studied and applied.

Semantic network: focusing on the establishment of the medical language system in the field of traditional Chinese medicine and its application and research in traditional medicine.

Table 2 Main terms in clustering topics

Serial number	High-frequency words	Frequency
1	Robot	Minimally invasive spinal surgery Hospital management Nurse Medical image processing Trigeminal neuralgia Imaging diagnosis
2	Expert system	Knowledge representation Knowledge base Neural networks Knowledge acquisition Image segmentation Medical informatics
3	Applications	Diagnosis TCM Big data Pathology Precision medicine
4	AI	Machine learning Deep learning Medical imaging
5	Graded diagnosis	Artificial intelligence technology Medical Association
6	Semantic Network	A medical language system Knowledge discovery Classification Chinese Medicine Language System Technical specifications Traditional Chinese Medicine Semantic Relations

4. Research frontier analysis

This research method is more suitable for discovering the new development trend and specific mutation of artificial intelligence in medical treatment, and usually uses more prominent topics than the most frequent topics to reflect the research content.

On Citespace data, a combination of techniques and algorithms is provided to detect keywords of extended search, which can combine high-frequency rate of change, emerging words, and keywords to clarify the frontier of current research on artificial intelligence. Based on the detection of creative words and time zones, the research frontier of artificial intelligence in the medical field is analyzed.

The hot words of artificial intelligence in this medical field have been changing very frequently from 2010 to 2016. By combining the obtained data, the research results of the application robot in the medical field in this period are also increasing rapidly, and the application of artificial intelligence in the medical field is a hot topic that is widely concerned by scholars. Taking "traditional Chinese medicine" and "traditional Chinese medicine" as the frontier of research, the research content of the application of artificial intelligence in the field of traditional Chinese medicine in recent years is also quietly improving. On the other hand, due to the continuous innovation of artificial intelligence technology, semantic networks, neural network, and machine learning have become the research focus of artificial intelligence in the medical field.

5. Conclusion

By analyzing the number of papers published in the application of artificial intelligence in the medical field and the drawings of visual knowledge map based on Citespace, the following conclusions can be drawn.

From the current domestic medical field and artificial intelligence combination publishing trend of the data point of view, The status of artificial intelligence medical research data becoming a hot topic can predict that the research and corresponding research results of artificial intelligence application in the medical field will increase significantly in the next few years.

There are three research hotspots. One is mainly used in surgery, rehabilitation training, nursing, rescue, transportation, and other medical fields of artificial intelligence robot applications. The application of robots in surgery and rehabilitation training is widely concerned by Chinese scholars. Second, the application of artificial intelligence in medical and health care. By using the medical large-scale data of diagnosis and treatment supported by artificial intelligence technology, the risk prediction, and medical treatment are realized, and the application possibility of artificial intelligence in the medical field is greatly improved, but data collection and information security guarantee has also become a major topic nowadays. One is the application of artificial intelligence in the field of traditional Chinese medicine. In recent years, the policy dividend and Internet + opportunities in China's pharmaceutical industry are also increasing, and the research results and contents of artificial intelligence in China's medical field are also increasing day by day. on the other hand, the issuance of Chinese medical ISO standards in 2014 promoted the application of the 2014 language system, semantic network, and technical rules of Chinese medicine.

From the point of view of the current search for data expression research frontier, there are four main aspects. One is the application of artificial intelligence in the medical expert system. After more than 20 years of development, the application of the expert system, from image expert system, bone tumor auxiliary diagnosis system, oral and chin facial trauma diagnosis and treatment expert system to rehabilitation training expert system and liver cancer knowledge expert system, has also been widely recognized by the majority of scholars.

The second is the application of artificial intelligence robots in the medical field. The third is the traditional Chinese medical field of artificial intelligence applications. The fourth is the application of artificial intelligence programs and algorithms in semantic network, neural network, mechanical learning and other medical fields. These algorithms and technologies are maturing in the medical field and the corresponding research is deepening, and the results are used to promote the application and development of artificial intelligence in the medical field.

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