On the application of big data analysis technology in the field of medicine

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Abstract: With the development of science and technology, big data analysis and processing technology is widely used in various fields and enterprises. The advent of the big data era marks that all work in China has entered an efficient and convenient era. Data classification, processing, transmission, storage and other work will be applied in all walks of life, and the pharmaceutical field is no exception. In the medical field, a large number of data and information materials are produced every day, such as gene sequences, medical images, medical records, clinical drug trial research data, etc. using big data analysis technology to collect and process medical information is an important way to effectively improve the rapid development of medical undertakings. This paper introduces the commonly used big data analysis technology, analyzes the value of using big data analysis in the field of medicine, and puts forward effective measures to promote the development of medicine by using big data analysis technology.

1. Introduction

With the advent of the era of science and technology, there has been an explosive growth of data in various fields, and big data has become a key topic of research in today's society, and its data analysis and application have become the focus of the world's scientific and technological circles and governments. The "era of big data" has really come to us. However, the current problem is still how to better obtain, classify, store, process and transmit these data. In the medical field, China is in an era of medical information explosion, such as medical images, power case records, gene sequences, multi center clinical drug trials and other fields will produce a large amount of data every day, which also promotes the comparative application of big data technology in the medical field[1].

2. Description of big data analysis technology

The core of big data analysis technology is to extract and screen valuable information from massive data. The data faced by this processing technology has clear characteristics, such as sea volume, fast generation speed, structural alienation, many states, etc. the work of big data analysis is to extract valuable data or information from all kinds of data and reasonably allocate data and information resources, Ensure the security of data transmission and storage. Traditional data processing technology is relatively backward, and it is difficult to classify and process a wide variety of information. Big data analysis is different. It can use cloud technology to upload and download massive information. Users can store information in the cloud, download it when in use, and delete it when not in use. The following describes several widely used big data analysis methods[2].

2.1 Machine anthropomorphic computing and data mining

Machine personification learning is the basis of big data analysis technology. Massive data has many dimensions and is changeable. How to extract valuable information from disturbing information requires equipment to learn human classification and induction and analyze information and data. Data mining mainly refers to the method of calculation by establishing data mining model, including support vector machine, expectation maximization, decision tree algorithm and so on.
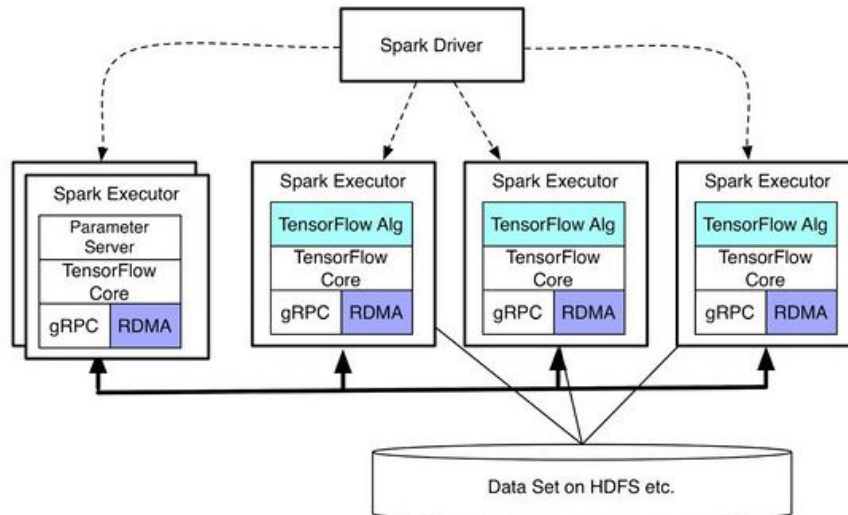
Figure 1 machine anthropomorphic computing and data mining

2.2 Predictive analysis method

This is a commonly used method in big data analysis methods. It mainly predicts the unknown data by establishing a model and using known reference values, so as to predict the possibility of events and the size of probability. The specific content of prediction analysis covers data detection and, data analysis and model establishment.

2.3 Visual information analysis

Among a large number of data information, another kind of information is the most intuitive, that is, visual information and data. The analysis and processing of this kind of information can help researchers make conclusions and decisions quickly. Visual information shows the data intuitively in front of us. We can quickly find the law of information and then quickly find valuable data. The advantage of visual information and data is that it is easy for users to understand, analyze and process information. Visual data analysis is generally manual analysis, and data analysis and research are carried out with the help of some software, such as tableau.

2.4 Keyword search engine

Keyword engine is widely used in the network. When searching and consulting data, you can search relevant knowledge and information as long as you enter key words. In big data analysis, sometimes you can use semantic engine to search similar information and data, and then separate them to improve data processing efficiency.

3. Main problems to be solved and treatment methods for realizing big data application in medical field

Big data in the medical field includes information of various diseases, patient's case information, medical examination information, medical image information, management information of various hospitals, information of traditional Chinese medicine students in hospitals, etc. with the rapid acceleration of the electronic process of medical institutions, these various types of data are generated dynamically and rapidly in various hospitals, How to extract useful information from medical big data is an urgent problem to be solved. To build a medical big data system, hospitals need to be connected through the Internet to realize data sharing among hospitals.

3.1 Structured and standardized processing of data

Big data in the medical field is mostly complex and unstructured data. The data may contain redundant, meaningless or inconsistent attributes, and the data is often updated. It is necessary to

analyze these data through big data analysis technologies such as data mining algorithm and machine learning. Text mining technology can realize the structure and standardization of electronic medical records, hospital management information, physician information and other data in the medical field. Combined with word processing technology, intelligent algorithms and computer technology, it can analyze a large number of semi-structured and unstructured text information, and extract valuable information scattered in text files.

3.2 Database system design

Because the traditional database system can not store and process the large-scale, many types and complex structure big data contained in the medical field, it is necessary to adopt the resource cloud system, establish the database according to the characteristics of the data generated in the medical field, and store these data by classification. Useful information can be extracted from these data by using data mining algorithm, and then the extracted information can be analyzed and processed by using high-speed cloud processing technology.

3.3 Data mining analysis

The core of data mining is to extract the features and attributes of data, and classify the data according to the features and attributes. Before data mining, data preprocessing is needed to improve data quality and the effectiveness and accuracy of data mining results. In data mining, it is necessary to select appropriate tools and analysis methods according to the characteristics, attributes and research purposes of data. Data mining analysis has been applied to microarray analysis, DNA sequence alignment, medical literature mining and medical data visualization.

3.4 Image information analysis method

Medical image technology is more and more widely used in disease diagnosis. Medical image information has become an important tool for disease diagnosis. Medical image information is unstructured data. Visual analysis technology, computer graphics technology and image processing technology need to be used in image information analysis.

4. Significance of using big data analysis in the pharmaceutical field

4.1 It helps to improve the clinical and scientific research level in the medical field

Big data has the characteristics of massive and fast. The arrival of the big data era is the result of the development of information technology to a certain extent. Making full use of big data analysis technology in the pharmaceutical field will help to promote the steady improvement of medical and health work efficiency. The traditional medical information and data processing efficiency is low, wasting a lot of manpower and time, and the error rate of manual data analysis is high, and the information processing and dissemination are difficult to meet people's current needs for medical information and knowledge. The application of big data technology can establish the treatment plan database of similar patients in medical institutions, It can provide scientific basis for the treatment of various diseases and promote the improvement of medical clinical and scientific research level.

4.2 It helps to promote the renewal of medical ideas

The first problem to be solved in big data analysis is the processing of all kinds of information and data in medical institutions. Big data is diverse and massive. Therefore, how to use modern technology to complete the collection, integration and classification of massive data and information, statistics and analysis plays a vital role in promoting the renewal of medical ideas. Medical big data analysis does not strive for excellence, but it must show the integrity of the medical field. The medical field should pay attention to the public's health psychology and health preservation concept, improve the treatment scheme, and then provide a reliable basis for the treatment of various diseases.

5. Application analysis of big data in medical and health field

Another important application field of big data analysis technology is pharmacy. In the field of pharmacy, the digitization of various drug information and instrument platforms is generating a large amount of data at any time. Big data analysis technology can be applied to drug action analysis and new drug research and development. It can mine useful information from a large amount of data generated by researchers in the process of looking for targets, establishing models and looking for compounds. Analyzing these information through quantitative methods can guide the design of drug research scheme, so as to improve the quality of drug research and development Resource utilization and R & D efficiency.

5.1 Application of big data analysis technology in new drug research and development

Network pharmacology and molecular docking technology are not only important tools for drug research and development, but also important fields for the application of big data analysis technology. The normal operation of various mechanisms in a complete organism depends on the integrity of the system and forms a stable and complex network system through the interaction between various nodes. Many diseases occur because the stable network system is disrupted and multiple nodes have problems. Therefore, the drug effect of single target research and development is often not ideal. With the help of network topology theory and research methods, the molecules and their interactions involved in the disease are abstracted as network nodes and edges, and the research is carried out by using relevant algorithms, which will solve the huge bottleneck problem encountered by traditional western medicine in new drug research and development with the research idea of single molecule and single target. Exploring new algorithms and developing new applications will be an important content in network pharmacology research. Establishing a complete and reliable protein network database, disease network database and drug network database will greatly improve the ability and level of new drug research and development and speed up the process of new drug research and development. Molecular docking technology is a common method of computer-aided drug design (CADD), which is applied to structure-based drug design. The method is based on the spatial structure of the target molecule, using a variety of small molecule compounds (such as tens of thousands or even hundreds of thousands of compounds in the small molecule compound database) for computer simulation and combination, and selecting the small molecule compounds with the best matching with the target molecule for drug research and development. High throughput screening can greatly shorten the time of drug development, predict the potential targets of drug molecules, and provide directional guidance for new drug research and development. Currently, the commonly used docking tools include dock, autodock4, etc. Molecular docking technology has achieved certain results in the research and development of new drugs. The HIV-1 protease inhibitor developed by molecular docking technology is a successful example. At present, the drug has passed the certification of FDA and has been put on the market. The use of big data analysis technology can also more accurately analyze the effects of various drugs and carry out drug research and development according to the characteristics of the disease, so as to design better treatment schemes for patients and use drugs more reasonably, so as to treat diseases more effectively.

5.2 Application of big data analysis technology in drug side effect analysis

The side effects of drugs will not only lead to the weakening of therapeutic effect, adverse reactions of patients, and even death of patients in severe cases, but also lead to some other diseases (drug-induced diseases) and increase the medical expenses of patients. According to the literature, the incidence of adverse drug reactions in outpatients is 0.3% ~ 5.0%, and that in inpatients is 10% ~ 20%. In the United States, more than 700000 people are injured or die due to drug side effects every year. In a 700 bed hospital, the hospitalization and outpatient expenses caused by drug side effects are as high as US $5.6 million every year. If the big data analysis technology is applied to mine and analyze the adverse drug reaction information of various hospitals and the adverse drug reaction information of a large number of people taking certain drugs in social networks (such as

Sina blog and medical network forum), the side effects of antidotes can be solved more scientifically and comprehensively and the harm of drugs to patients can be reduced, At the same time, reduce the economic burden of patients.

Table 1 Analysis of drug side effects

type	Incidence of adverse drug reactions
outpatient	0.3%-5.0%
hospitalized patient	10%-20%

5.3 Effect of big data analysis on public health and residents' health

Big data analysis can also be widely used in public health publicity, early warning and forecasting of various diseases, improving people's health concept and effectively controlling the epidemic situation of infectious diseases. The public health department can establish a health information management platform for the management area to collect the health information of residents within its jurisdiction, so as to effectively grasp the health status of residents and control the epidemic situation. Secondly, residents' health electronic information archives are also a manifestation of big data analysis and application. Big data can be used to integrate all kinds of patient information, so as to improve residents' health concept.

6. Conclusion

At present, the society has entered the era of big data. With the rapid development of science and technology, new theories, methods and technologies related to big data are constantly emerging. Big data analysis technology is playing a more and more important role in the pharmaceutical field. The construction and development of big data analysis system will have a significant impact on the pharmaceutical field and other fields. Personalized medicine based on genomics big data and modern biomedical technology, namely precision medicine, is the development direction of medicine in the future. The application of big data analysis technology will certainly improve human living environment, improve human quality of life and health level[3].

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