

Application of Information System Integration and Analysis in Medical Image Data Mining

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Abstract: With the rapid growth of our national economy, the development of computer information system integration industry has been further promoted. In the process of medical development in our country, project management, as a key work, has higher and higher requirements. It has driven a series of related industries to step into the information management era. Hospitals have also grasped this opportunity and promoted the continuous development and perfection of the information system they are building. How to make full use of these precious medical information resources to provide scientific decision-making and basis for the auxiliary diagnosis and treatment of diseases has become a hot topic. This paper introduces the basic theory of information system integration and analysis technology and its analysis and research process, and expounds its application in medical image data mining in detail.

1. Introduction

After nearly 30 years of development, domestic hospital information systems have gradually established dozens of systems, including hospital information system, laboratory management system, picture archiving and communication system and electronic medical record system [1]. With the popularization and application of medical image information system and medical image archiving and transmission system in hospitals and the gradual development of medical image resource network, medical image data are increasingly abundant, but at present they are only limited to the electronic operation application instead of traditional films, and the analysis and utilization of information are seriously insufficient. In order to solve the above-mentioned software crisis, many documents and materials have discussed the software development methods in depth, but there is still a lack of a relatively perfect development scheme [2]. Data mining of medical images aims at mining effective models, associations, rules, changes, irregularities and general rules from massive image data, so as to speed up the process of doctors' decision-making and diagnosis and improve the accuracy of their decision-making and diagnosis. This study explores the theoretical knowledge and mining methods related to information system integration and analysis technology, and analyzes the effect of extracting effective information based on medical image data mining. The aim is to improve the contents of the database and quickly obtain effective imaging data.

2. Construction Content of Hospital Information System Integration Platform

2.1. Overview of Information System Integration Platform

Information system integration platform refers to a platform that collects a large amount of data through information technology and is used for data sharing among various departments [3]. The application of project management in the integration of computer information systems can supervise and manage information systems and computer equipment in real time, effectively optimize computer equipment, and improve the computer control level and various capabilities of staff. The benefits of implementing information management in hospitals are manifold. From the perspective of information management personnel, it is also quite convenient for management personnel to manage these information resources. Information system is through the implementation of

computing programs, editing and storing these data, and finally draw accurate conclusions, providing users with meaningful information, which can help medical managers to make correct decisions and carry out effective management [4]. Hospital information is divided into two categories: clinical information and management information. Each category has a large amount of data flowing in the system, so the robustness of the system must be guaranteed. Meet the standardization requirements, can be very easy to integrate the hospital's various systems, thus improving the hospital's information sharing degree, improve work efficiency.

2.2. Composition of Information Platform System

Compared with the information integration system, the concept of data integration is very simple, which refers to the behavior in order to solve the data exchange between heterogeneous data, realize the sharing of data resources, and then use resources more efficiently and make decisions more scientific and reasonable [5]. Typical data integration models are unified at the data storage layer, system function layer and user interface layer according to the description of rules and the definition of data format, as shown in fig. 1.

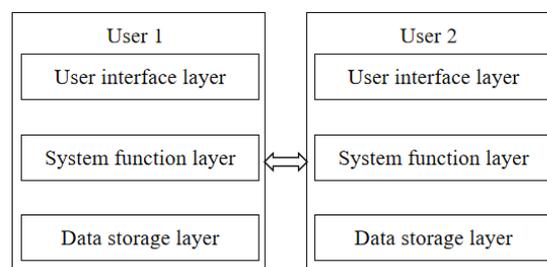


Figure 1 Data integration model

The operating system, database and network system necessary for the operation of hospital information system are required to be safe, stable and reliable. The development unit shall provide guarantee in this respect and provide technical training, technical support and technical services. The process of hospital informatization is gradual and decentralized. Each application system of the hospital comes from different developers, runs on different system platforms, adopts different technologies and standards, and the data between systems is difficult to share. There are mainly three subsystems, namely medical staff system, hospital management system and patient service system [6]. Each subsystem has its own duties and a clear division of labor. The frequency relation of data item sets in transaction database is screened out, and valuable correlation between data item sets in a large amount of data is found. On the basis of fully grasping the overall and real situation of the current system and analyzing the information needs of users, the logical model of the new system is proposed.

2.3. Construction of Hospital Management System

Image data mining is to extract implicit knowledge from image data sets. It includes the relationship between images, the relationship between images and character data, the relationship between entities in images and other modes or relationships. The frequency of simultaneous occurrence of words in a certain window is used as the corresponding element value in a co-occurrence matrix or a word vector. Establishing co-occurrence matrix requires lexical similarity information in statistical literature. The operation management is mainly aimed at the financial situation and equipment situation of hospital operation, so as to take a series of measures to make up for the deficiencies as soon as possible. However, the algorithm depends on the type of data, the purpose and application of clustering, and sometimes several algorithms are tried on the same data, or several algorithms are analyzed jointly, so as to discover the hidden knowledge and laws of the data as much as possible [7]. Whether the system needs to be designed is determined by analyzing the problems that may exist in the development process of the system and the favorable benefits and economic promotion that the system can bring. Hospital information system is a system operating in a network environment. Therefore, data sharing, interconnection and intercommunication should be

realized among various modules to clearly reflect the internal logical connection, and the data must be interrelated and mutually restricted.

3. Application of Information System Integration and Analysis Technology in Medical Image Data Mining

The integration and analysis technology of medical text information system can assist the work of medical researchers in many aspects, and can help users to find useful information quickly and effectively in a mass of document information set. Because in the relational database and the image database, the data item's attribute and the meaning expressed by the value have the very big difference. So as to implement operations of storage, transmission and the like, sort out various medical digital influences and communication standard information such as generated images, waveforms and the like, and establish a structured report tree document according to different types of medical digital influences and communication standards. The way images are combined into sequences depends on their clinical use [8]. However, it is not important for grouping how images are acquired morphologically. When applied to lung image classification, support vector machine classifier can also accurately classify according to texture, and accurately distinguish pulmonary diseases such as pulmonary tuberculosis, pulmonary interstitial fibrosis and asbestosis. Through cluster analysis of natural epidemic diseases, and relying on the direct results of mining, the distribution of epidemic focus in the whole country can be determined, new epidemic focus can be found, and the heavy epidemic areas of epidemic disease and the historical changes of epidemic focus can be found. The information system integration platform not only facilitates patients, but also brings benefits to the working life of medical staff. With its help, hospitals will benefit a lot.

The establishment of the integrated platform information system has promoted the mutual cooperation among various systems and made their connection increasingly close. Hospital staff are no longer worried that they will not be able to collect information and data, and departments are no longer as closed as before. Information system integration and analysis is generally divided into three steps: data extraction, construction of co-occurrence matrix or vocabulary vector, and data analysis. The process of information system integration and analysis will also be different according to the different research purposes (see Figure 2).

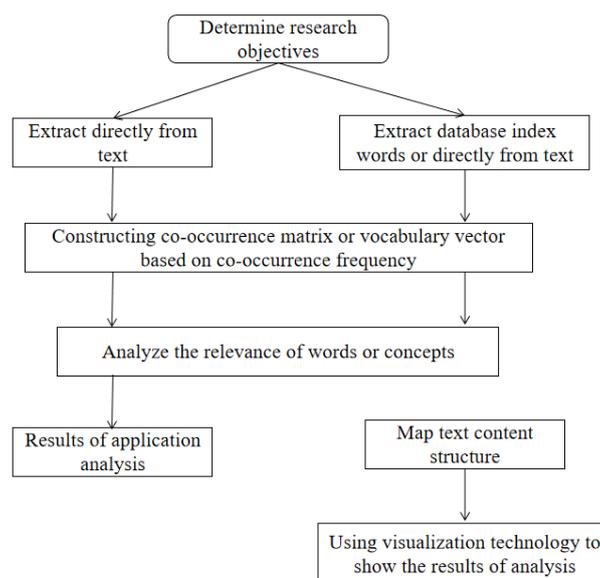


Figure 2 Information system integration and analysis operation flow

Due to the particularity of medical image expression information and other factors, it is quite different from general image mining. Medical image data describes anatomical information of human tissues and organs, which contains abundant information. The storage and transmission of structured reports adopt recursively nested item sequence data sets in medical digital impact and

communication standards, which are concatenated using a tree structure, verified and audited. For example, the increment of time or system movement is equal between all frames. Generating multi-frame images is more complex than single-frame images and consumes more resources. The high sharing of data makes the hospital work smoothly and relieves the working pressure of management staff. The system structure is responsible for all procedure calls. Application developers only need to add the program code of the processing program. Correlation analysis can help us to determine the types of genes that occur simultaneously in the target sample, thus contributing to the study of gene combinations and linkage interchange among genes. This process requires preliminary determination of data attributes required for data mining, and preliminary mining tests are conducted by small-scale sampling from the original database. The test results are compared with the mining targets determined in the previous step, and the data attributes are updated if necessary.

Medical image data set is quite large and complex, so it is necessary to preprocess the image before mining medical image data. The basic idea is to map the sample space to a high-dimensional or even infinite-dimensional feature space through nonlinear mapping, and to find the optimal partition or regression of linear hyperplanes in the feature space, thus solving the problems of highly nonlinear classification and regression in the sample space. Due to the use of object-oriented modeling technology for detailed analysis of user requirements, the maintainability and expandability of the system are greatly improved. It should conform to the current hospital structure system, management mode and operation procedures, and can meet the needs of the hospital for information within a certain period. Plan the contents in different databases as a whole. Network integration is its emergency department, and data as the carrier of information resources is the soft foundation and the primary task of the system. Medical image databases are generally multidimensional, and dimensions are expressed by attribute formats. Multidimensional data mining methods have become an important research content of medical image mining. The conclusion of medical data mining is explained and compared with the original research goal. Trace the steps of possible errors in the whole data mining process and find the solutions. The adoption of the integrated system has reduced the maintenance cost of the system and the workload of management staff to a certain extent.

4. Conclusion

With the continuous development of China's socialist modernization and the continuous improvement of scientific and technological level, people are paying more and more attention to the construction of medical information system integration platform, and the requirements for this system are also constantly improving. The purpose of data integration is that heterogeneous data can share data resources, thus realizing the maximum utilization of resources more reasonably and effectively, providing managers with more comprehensive information, and making users' data measurement more scientific and reasonable. The purpose of medical image data mining is to automatically analyze a large amount of original medical image data to obtain useful knowledge. Digging out useful diagnostic information for doctors, assisting doctors in diagnosis, improving diagnostic accuracy and efficiency, thus reducing misdiagnosis. Therefore, the staff need to combine the actual situation, flexibly use various advanced technical management methods and concepts, build a sound risk management mechanism, build a team of high-quality talents, and provide guarantee for the development of computer information system integration.

References

- [1] Xiong Zhigang, Yao Gang. Research on medical big data mining based on the first page of medical records. *China Digital Medicine*, vol. 011, no. 009, pp. 11-14, 2016.
- [2] Meng Xiaxia, Wu Zhifang, Zhang Yanbo, et al. Research progress of tumor imaging omics based on medical imaging data mining. *Chinese Journal of Nuclear Medicine and Molecular Imaging*, vol. 39, no. 2, pp. 116-120, 2019.

- [3] Ning Kang, Chen Ting. Status and prospect of biomedical big data. *Science Bulletin*, vol. 60, no. 5, pp. 534-546, 2015.
- [4] Li Yutong, Yao Dengju, Li Zhe, et al. Research on medical big data mining system based on R. *Journal of Harbin University of Science and Technology*, no. 02, pp. 38-43, 2016.
- [5] Wang Shan, Fan Xiude, Yin Panpan, et al. Analyzing the effect of HMGB1 expression on the prognosis of gastric cancer based on data mining. *Journal of Jining Medical College*, vol. 41, no. 1, pp. 64-68, 2018.
- [6] Cui Yao. Exploration of hospital information data mining and implementation technology under medical cloud storage. *Digital Technology and Application*, no. 5, pp. 239-239, 2016.
- [7] Peng Yuming, Chen Weihao, Mai Dingkan, et al. Image character detection and recognition based on data mining technology. *Electronic Technology and Software Engineering*, no. 18, pp. 105-106, 2016.
- [8] Liu Jie, Zhang Shuyan, LiuJie, et al. Application of data mining in laboratory medicine. *Chinese Journal of Laboratory Medicine*, vol. 38, no. 12, pp. 888-890, 2015.