

## Safety status analysis of hospital information system and countermeasures

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**Abstract:** Elaborated in order to meet the needs of the current hospital information security in this paper. The application of new intelligent information security technology to hospital information security is still very little, the model of intelligent intrusion detection system based on clustering analysis and boundary point detection technology is developed to apply to the hospital information system to improve the safety level of the hospital information.

### 1. Current situation of hospital information security

Health care is related to the people's livelihood of the people of all ethnic groups. Hospital information construction, not only greatly improve the hospital's work efficiency, quality of service, but also conducive to the management of patient information. At present, hospital information system was applied in every large second class A level hospitals in our country. Hospital Information System (Hospital Information System, HIS) is a application system which have the ability of providing patient care information and administration information collection, storage, processing, extraction and data exchange and meet the functional requirements of users authorized by modern computer software, hardware, network communications and other modern equipment[1]. In the process of the application of hospital information system, a large amount of data access, transmission, processing, and stored in the computer, the information resource security directly affects the normal operation of medical order, protect the interests of patients, medical security and financial security management.

However, in recent years, hospital information security problems emerge in an endless stream. The security situation of the information system of 37 second-class hospitals in Henan province was investigated[2]. 30 (81.1%) hospitals among the 37 hospitals has been infected with viruses, worms, trojans, spam procedures, internal personnel abuse network port and system resources of the network security events. There are 35 (94.6%) hospitals have the means of finding network security event are 2 and more than 2. There have 18 (48.6%) hospitals which have four or more security incident caused a partial loss of data, the use of software is limited, the system can not be used, the network can not use. Such as from December 17, 2012 to December 19th three days, Beijing Ji Shui Tan Hospital, and Beijing Friendship Hospital, Beijing hospital information system problems, resulting in hospital outpatient registration, fees are affected.

The above data shows that all levels of hospital information security incidents occur frequently, and caused some harm. For the hospital, how to ensure the safety of hospital information has become a problem that can not be ignored. Especially with the application of computer network in

the hospital information system in the deepening of the openness of the Internet, Internet makes the hospital information easy to be leaked, stolen, tampered with, and at the same time, posing as destruction; hackers and worms, viruses and other individuals and a mixture of attack causing hospital confidentiality, data integrity. Controllability is seriously affected.

Hospital information system security can be divided into two aspects of information security technology and information security management, technical measures, including: hardware technology and software technology measures; Management measures include: to establish information security management organization and management system, quality monitoring system, planning good contingency plans in advance[3]. Domestic famous information security management standards are CC[4], ITIL[5] and etc. ISO/IEC13335 is international standards [6]. At present, most researchers focus their efforts on the research of hospital information security management[7][8]. But in view of how to apply the new intelligent information security technology to hospital information security research is relatively insufficient.

## 2. Status of intrusion detection

With the rapid expansion of computer, network and mobile network, network intrusion is becoming more and more complex. China Internet site development and security report (2015) shows that phishing sites, tampering and implanted backdoor, online Trojan, conspiracy procedures, malicious websites, phishing, zombie networks are increasingly rampant. In such a large environment, relying solely on traditional security technologies, such as the application of firewall, authentication and data encryption and other preventive technologies, has been difficult to protect network security. Intrusion detection is an important research hotspot in the field of network security, which is an important research hotspot in the field of network security.

The concept of intrusion detection was first proposed by Anderson in 1980[9], he puts forward the concept of the audit data to the intrusion detection in this paper. Traditional intrusion detection mainly through the collection of computer system audit, log records or network key points of data flow analysis, found that the computer system or network constitute a security threat behavior, Such as attacks, illegal operations, etc[10]. But with the development of computer and network technology, the attack means is more and more complicated, the mutation rate is faster and faster, so the intrusion detection system based on traditional statistical analysis, due to the existence of the rule base can not automatically update, over reliance on expert analysis, leakage detection rate and false detection rate higher shortcomings, can not meet the safety the current demands.

Intrusion detection is essentially a data analysis on the specific data in the network or computer. Data mining is the data from the massive noise, rough, incomplete, fuzzy, random and uneven, in which the extraction of implicit, unknown, but potentially useful information and knowledge process[11]. Data mining technology has a great advantage in extracting features or rules from massive data, which can solve the problem of current intrusion detection. The application of data mining technology in intrusion detection system not only can solve the traditional intrusion detection system over reliance on expert knowledge, the problem of low efficiency; but also can reduce human involvement, the intrusion detection system has better intelligence. Therefore, the data mining technology in the field of intrusion detection has been more and more widely used.

Clustering analysis is an important method in data mining, which aims at the physical or abstract objects based on similar set is divided into several clusters, which has high similarity between the objects in the same cluster, and different clusters of objects in different height[12]. Edge detection technology is an important branch of clustering analysis, it plays an important role in the field of disease prevention, biology, image retrieval, virtual reality, and improve the accuracy of clustering. Clustering and boundary point detection is an unsupervised learning approach, their detection rate

for unknown intrusion model is high, but at present on how to effective clustering and boundary point detection technology is introduced into the research of intrusion detection technology is few.

### **3. An overview of the development of hospital information system at home and abroad**

As early as the middle of 1950s, some hospitals in the United States began to use computer technology for financial and accounting management, and then the computer in the hospital management more and more things, and gradually form a hospital information system. In twentieth Century 60-70, Europe and Japan have applied computer technology to the management of hospital information. The developed countries have invested a lot of manpower and financial resources in the research and application of hospital information system, and have achieved good results. Specific as follows:

(1)In the beginning of the 60-70's in twentieth Century, the United States began to explore the hospital information system in depth. By 90s, the hospital information system was gradually mature. From the end of the 1990s to the present, the researchers mainly focus on the development of electronic medical records, computer aided decision making, unified medical language system (UMLS) and clinical information sharing and so on. At present, with the rapid development of computer information network and exchange system, hospital information system is being developed in the direction of miniaturization, intelligence and integration. Hospital information system in the United States has been in the forefront of the world, its greatest achievement is the technology of other disciplines and hospital information technology continue to be integrated, and constantly improve the availability of hospital information system. The representative hospital information system: Distributed hospital computer system for the United States Veterans Administration, HELP system developed at LDS hospital, Salt Lake City, Utah, USA.

(2)Japan in the introduction of the hospital information system at the beginning, will research, popularization and application of electronic medical record rise as a national policy, through the organization of a strong R & D and management team, the state gives financial focus that hospitals in Japan has been widely used in hospital with advanced information system. Therefore, Japan's Hospital Information System with a high degree of standardization, security mechanisms, confidentiality and legal protection and other advantages, to maintain a leading position in the world. Kochi Medical University comprehensive medical information system and the Affiliated Hospital of Kitasato University comprehensive information system have representative.

(3)Hospital information construction in European countries is mainly to a large range of medical institutions, linkage management. Through this management model, the country has made remarkable achievements in the integration of medical resources, remote medical treatment, and improve the efficiency of the use of medical resources, and enhance the ability of the country's medical services. Such as: 1995, the Danish government support red system, for the unified management of 76 hospitals and eighth clinics; the French health care center has realized the integrated hospital information system can manage three big hospitals and three medical college; Britain and France, Italy and Germany's companies are involved in the SHNE project (the healthcare information network system engineering), strategic purpose is to share the information of hospital. Such as, In 1995, the Danish government supported the red system for unified management of 76 hospitals and clinics, France eighth health care center to achieve the management of three large hospitals and three medical colleges of the integration of the hospital information system, companies in Britain, France, Italy, Germany and other countries are involved in the EU's SHNE project (EU health care information network system strategy project), the purpose is to share the hospital information.

The application of information technology in the hospital of China started late, which late nearly

20 years compared to the above countries. The hospital of first use the computer to carry on the hospital management in our country: Peking Union Medical College Hospital, Beijing Cancer Hospital, 301 Hospital Affiliated Hospital of a few large and comprehensive teaching hospital. These hospitals mainly use the computer to carry on the teaching and the scientific research work. But in recent years, with the rapid development of computer and network, more and more people realize the important position and function of the computer in the construction of a modern hospital, China's rapid development of hospital information construction, has a considerable size. Especially the 85 HIS project, the national health project, national health information network, information on cooperation projects, promote the hospital information management system and rapid development in China, to further improve the hospital information management, second A hospitals and above are using information systems within hospitals, some medical software company, such as the nine array technology, saiYou, macro and retop, also developed a complete hospital information management system application in the hospital.

At present, the hospital information system used in major hospitals mainly includes two categories: clinical management and medical management. Clinical application category mainly includes outpatient emergency registration system, medical management, electronic medical record system, clinical examination system, medical imaging system, antimicrobial drug management system, medical management system, etc. Medical management mainly includes outpatient charging system, hospitalization fee system, financial management system, the management system of the pharmacy store, emergency pharmacy door management, hospital pharmacy management, hospital management, medical record management and settlement system, supply room management system, "one card solution".

There are three stages in the development of hospital information system both at home and abroad:

(1) At the beginning of the "single version" fee registration system.

(2) Hospital information system of hospital local area network "client and server" mode used by major hospitals at present.

(3) Hospital information system of national network in the future. On the one hand, the need for hospital doctors and patients like remote consultation, appointment and other more services, on the other hand, is a necessary part in the whole social security system, plays an important role in science, education and research, which requires the hospital information system should be gradually from closed to open, to achieve nationwide networking. In the process of gradually opening, the network security and data of the hospital information system becomes very important. It is closely related with the patient's satisfaction, the credibility of the hospital and the medical disputes and other social problems and legal issues.

#### 4. Research meaning

In order to improve the intelligent intrusion detection system and intrusion detection system to reduce the false detection rate and miss rate. In the project, the clustering analysis and boundary point detection technology in data mining are introduced into intrusion detection technology, and the intelligent intrusion detection system model based on clustering analysis and boundary point detection is developed. At the same time, in order to meet the current needs of hospital information security, aiming at the new intelligent information security technology applied to hospital information security in the relative lack of this problem, intelligent clustering and boundary detection technique of intrusion detection system model is applied to the hospital information system will be developed based on the corresponding information, improve the safety level of the hospital.

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