Research on Data Management System for Drug Testing Based on Big Data

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Abstract. The traditional drug detection data management system has the disadvantages of limited submenu generation and uneven distribution of management rights. In order to solve these problems, a new data management system based on big data is designed. Through the two steps of .NET framework and B/S detection module design, the hardware operation environment of the new system is completed. On this basis, determine the MyEclipse node and the detection process. Under this precondition, all the process parameters related to drug data are stored in the system database for a long time, and the total amount of E-R data can be determined, and then the design of drug testing data management system can be completed. The experimental results show that compared with the traditional system, the management authority distribution uniformity of the system can reach 81.57%, which is much higher than that of the traditional method. The application of the new system can effectively improve the submenu generation rate.

Keywords: Big data · Drug testing · Data management · .NET framework · B/S module · MyEclipse node · Detection of circulation · E-R data

1 Introduction

Big data is a collection of data that cannot be captured, managed, and processed by conventional software tools within a certain time frame. It is a massive and high growth rate that requires new processing modes to have stronger decision-making power, insight and process optimization capabilities, diverse information assets. With the advent of the cloud era, big data has also attracted more and more attention [1]. Detection data management is an emerging form of system management. This technology fully utilizes the concept of big data and achieves the goal of increasing the operating speed of the system by continuously integrating operational advantages of cloud computing. In the past nearly 70 years, China's drug testing companies, with the support of big data technology, have directed improvements to data management technologies, and have designed a common drug testing data management system by

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introducing a network framework architecture. However, with the advancement of scientific and technological means, the sub-menu generation rate of this method and the evenness of the distribution of management rights cannot always reach the expected level. In order to avoid the occurrence of the above situation, a new type of drug detection data management system based on big data is designed. The specific research framework is as follows:

(1) The hardware design of the system is mainly realized through two parts: the NET framework and the B/S detection module;
(2) System software design. Determining the data management node, under the condition that the total number of drug data management nodes is known, the transmission data between each module of the system is normalized and the data is detected circularly. Finally, determining the total amount of E-R data;
(3) Experimental results and analysis. Two comparative indicators are selected for analysis: Submenu generation rate comparison, Comparison of management authority distribution uniformity. The practical value of the system is proved through comparative experiments;
(4) Conclusions.

2 Hardware Design of Data Management System Based on Big Data Drug Detection

The hardware operation environment of the new drug detection data management system includes the two basic links of the .NET framework and the B/S detection module. The specific construction method can be performed as follows.

2.1 NET Big Data Management Framework

The .NET big data management framework mainly includes the following components: The first is the foundation of the entire drug testing framework, namely the universal language runtime and the set of basic libraries it provides; In the development of technology, .NET provides a new database access technology ADO.NET, as well as network application development technology ASP NET and Windows programming technology Win Forms. In the development of languages, .NET provides VB, VC++, C#, Jscript and other language support. Visual Studio .NET as a development tool will fully support .NET [2, 3]. For drug detection data management technologies, the .NET-provided basic class library includes everything from input and output to data access, providing developers with a unified object-oriented, hierarchical, and extensible programming interface. The concrete management framework structure of .NET big data is shown as in Fig. 1.

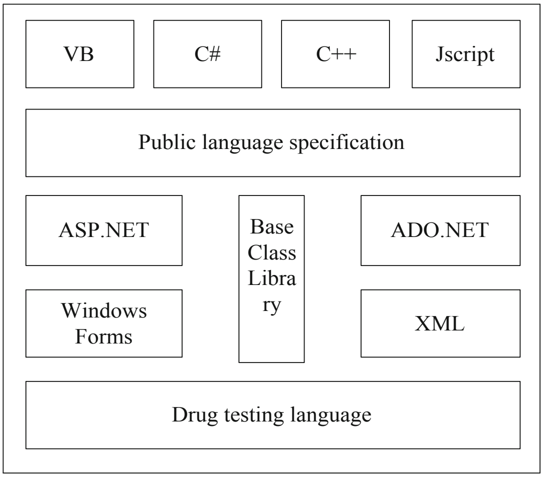

Fig. 1. Structure of the .NET big data management framework

2.2 B/S Detection Module Design

The B/S drug detection module can be considered as a special C/S structure using a Web browser. The B/S structure mainly uses a database server and one or more application services, i.e. Web servers, to form a three-tier structure client/server system. In other words, the client used in the first tier is the interface between the user and the entire network application system. The client can use the simple browser software to connect to the server and achieve the purpose of access [4, 5]. Because the client of the B/S structure does not need to install special client software, the programmer does not need to write the corresponding client application for the client alone. In addition, in terms of maintenance, because of the ever-changing society, software may be updated at any time. For the main functions are on the server side, the B/S structure will be updated and maintained in the future, which will save time and effort. It only needs to update and maintain the web browser. It does not need to maintain all the drug data clients and is convenient for users in different places. The specific structure of the B/S drug detection module is shown in Fig. 2.

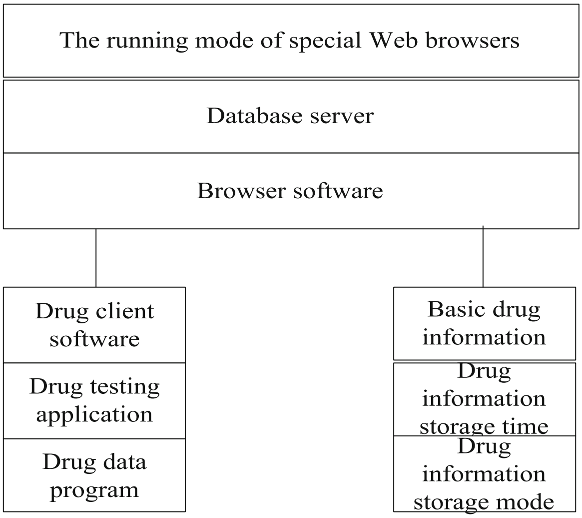

Fig. 2. Block diagram of B/S drug detection module

3 Design of Data Management System Software Based on Big Data Drug Detection

Based on the hardware operating environment of the new drug detection data management system, through the MyEclipse data management node determination and other steps, the system software operating environment is set up.

3.1 Determination of MyEclipse Data Management Node

MyEclipse drug data management node exists in the form of an Eclipse plug-in. It is a fully-supported JavaEE inheritance development environment and includes functions such as code writing, environment configuration, testing, debugging, and Pingcuo. After MyEclipse 6.0 version does not need to install Eclipse, into a separate plug-in MyEclipse 6.X version [6]. Under the support of the system hardware operating environment, the .NET big data management framework provides a dependency environment for drug detection data, and the B/S detection module provides temporary storage space for drug detection data. The drug detection data processed by the above operation has a certain anti-identification function, and can perform short data blur processing in the MyEclipse management node, which is a novel system that achieves a high level of instantaneous operation speed. The specific drug detection data management node determination method is shown in formula (1).

$$\xi = \frac{\left| g \cdot \frac{h-l}{\beta} \right|}{\mu + \sqrt{(f + ds^2)}} \tag{1}$$

Among them, ξ represents the drug testing data management node, g represents the execution parameters of the Eclipse plug-in, h represents the inheritance development constant of the JavaEE software, l represents the code writing coefficient, β represents the system processing parameter, μ represents the dependent stator provided by the big data management framework for drug detection data, f represents the temporary coefficient of the B/S structure, d represents the anti-identification constant, and s represents the fuzzy factor of the targeted drug detection data.

3.2 Determination of the Detection of Circulation

Drug testing throughput is the machine language that is transmitted between the various system modules. When the hardware development environment of the system is in a stable state, certain wearable parts in the tablet detection data will wear out, resulting in a packet loss phenomenon in some data and causing a drop in system operating efficiency [7]. In order to avoid the occurrence of the above-mentioned situation, under the condition that the total number of drug data management nodes is known, the transmission data between each module of the system is normalized so that all the drug detection data to be transmitted have certain identifiable conditions [8, 9]. When the marked data passes through the specific operating module of the system, the wear condition of the transmission node can be forced to stop due to the normalization process, thereby achieving the purpose of increasing the system operating speed. Let k be the normalization parameter and use k to express the drug detection flux as:

$$Z = \int_{c=1}^{v \to \infty} \xi k + \frac{b + x}{m} \tag{2}$$

Among them, q represents the drug detection circulation, t represents the lower limit of the abrasion degree that can rely on the transmission node, r represents the upper limit of the abrasion degree that can rely on the transmission node, u represents the marking parameter of the drug data, i represents the data packet loss rate, G represents the basic transmission efficiency of the system module.

3.3 Determination of Total Amount of E-R Data

The total amount of E-R data is a physical factor with a description function. Under the premise that the drug data management node and the drug detection circulation volume are known, the lower level operation module of the system always maintains a stable operation state. At this time, all the process parameters related to the drug data are stored in the system database for a long time [10]. When the client sends a data call command to the system, some drug detection data with dynamic physical properties will enter the system display interface through the output device. At this time, the client can obtain a complete call receipt by judging the storage type of the data, and then realize the smooth operation of the new drug detection data management system based on Big Data. Using formula (2), the total amount of E-R drug test data can be expressed as:

$$q = \prod^{Z} \left\| \sum_{r \to -\infty}^{t \to \infty} (ui + w) \right\| \tag{3}$$

Among them, q represents the total amount of E-R drug detection data, t represents the upper limit of callback, r represents the lower limit of callback, u represents the core storage limit of the system database, i represents the call operation coefficient of the client, and w represents the system output amount.

4 Experimental Results and Analysis

To verify the practical value of a new type of drug detection data management system based on Big Data, the following comparative experiment is designed. The two computers are equipped with a new system and a traditional system, respectively, with the former being the experimental group and the latter being the control group. With 100 min as the experimental time, the changes in the generation rate of the submenus and the uniformity of distribution of management rights after application of the experimental group and the control group system during the period of time are verified.

4.1 Submenu Generation Rate Comparison

The following table reflects the specific changes in the sub-menu generation rate after the application of the experimental group and the control group system within the 100-min experiment period.

Analyzing Table 1, we can see that with the increase of experiment time, after the application of experimental group system, the generation rate of sub-menu appears to rise first and then change again. After 90 min of experiment time, the sub-menu generation rate reaches a maximum of 5.80 × 107 Per/min; After the application of the control group system, the sub-menu generation rate has a tendency to increase first and then decrease stepwise. When the experiment time is in the range of 70–80 min, the sub-menu generation rate reaches the maximum value of 4.82 × 107 Per/min, which is much lower than the experimental group.

Table 1. Submenu generation rate comparison table

Experimental time/(min)	Changes in the generation rate of the submenu in the experimental group/(Per/min)	Changes in the rate of submenu generation in the control group/(Per/min)
10	2.71×10^7	1.46×10^7
20	2.98×10^7	1.46×10^7
30	3.43×10^7	2.98×10^7

(*continued*)

Table 1. (*continued*)

Experimental time/(min)	Changes in the generation rate of the submenu in the experimental group/(Per/min)	Changes in the rate of submenu generation in the control group/(Per/min)
40	3.86×10^7	2.98×10^7
50	4.01×10^7	3.57×10^7
60	4.55×10^7	3.57×10^7
70	4.97×10^7	4.82×10^7
80	5.19×10^7	4.82×10^7
90	5.80×10^7	4.69×10^7
100	5.80×10^7	4.69×10^7

4.2 Comparison of Management Authority Distribution Uniformity

The following table reflects the specific changes in the distribution of management authority after applying the experimental group and the control group system within 100 min of the experimental period.

Analyzing Table 2, we can see that with the increase of the experiment time, the uniformity of management authority distribution shows a decreasing trend and a rising tendency when the experimental group system is applied. When the experiment time is 70 min, the management authority distribution evenness reaches a maximum of 81.57%; After the application of the control group system, the uniformity of management authority distribution shows a trend of first increase and then decrease. When the experiment time is 50 min, the uniformity of management authority distribution reaches a maximum of 54.29%, which is much lower than the experimental group.

Table 2. Comparison of uniformity of management rights distribution

Experimental time/(min)	Experimental group management authority distribution uniformity of specific changes/(%)	Control group management permission distribution uniformity of specific changes/(%)
10	77.82	50.03
20	60.05	51.21
30	79.41	52.16
40	61.23	53.80
50	80.52	54.29
60	60.18	53.88
70	81.57	53.67
80	60.94	52.59
90	80.57	51.04
100	61.33	50.23

5 Conclusions

Analysing and contrasting the experimental results shows that after applying the big data-based drug testing data management system, the sub-menu generation rate has increased by 0.98×107 Per/min, the uniformity of management authority allocation has increased by 27.28%, and the construction process of this new system is simple. Therefore, compared with the traditional drug detection data management system, this new type of system is more practical.

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