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Enhance the Efficiency of Enterprise Management Based on Big Data and Intelligent Informationization

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Abstract:

In this paper, based on big data, an intelligent enterprise management system is designed. It usesa management application innovation module to realize enterprise intelligent management application innovation through multiple screen interaction methods. Then data analysis technologies such as data processing and data cleaning are used to findthe hidden information, timely understand customer behavior and requirements, and improve enterprises' product sales. The experimental results show that the expected results of the system testing are the same as the actual results. When the proposed system is used for enterprise management, the maximum throughput of the system is 290 000 Mb/s, and the average response time is 3.5s. Therefore, the experimental data indicate that the proposed system can achieve efficient enterprise intelligent management.

Key words: *big data; Intelligent information technology; Business management;*

I. INTRODUCTION

Big data technology has become a key point for the development of enterprises. With the reduction of data storage costs and the popularization of mobile Internet, big data technology has been applied in the analysis and prediction of enterprises'bigevents[1]. The intelligent management of enterprise data can be realized by dealing with the classification of Web network data. However, this method does not widely use the big data management method in enterprise management, resulting in the low efficiency of enterprise management. The design of an enterprise management system in a network environment has a poor effect on big data analysis in enterprise management and has the disadvantage of a long response time. The data management system based on the big data cluster architecture lacks the cleaning process of the redundant information in the big data, and cannot accurately judge the failure data in the system, so it has a poor management performance. To solve the above problems, an intelligent enterprise management system based on big data is designed to achieve efficient intelligent enterprise management[2].

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II. DESIGN OF INTELLIGENT INFORMATIZATIONENTERPRISE MANAGEMENT SYSTEM BASED ON BIG DATA

2.1 Overall structure design of the system

The structure of the intelligent enterprise management system designed based on big data is shown in Figure 1. In the context of big data, the enterprise swarm intelligence dimension and human-machine combination intelligence dimension constitute the frame structure of the enterprise intelligent management system[3].

2.2 Structural design of management application innovation module

Figure 2 shows the structure of the management application innovation module. According to Figure 2, product data and user behavior data represent customer insight dimension, product design dimension, precision marketing dimension, etc., which are innovative contents of enterprise intelligent management system application[4]. To complete the detailed investigation of customers, using large-scale data and real-time data can shorten the time for enterprises to collect user data and significantly improve enterprises' operation and management efficiency and user experience .

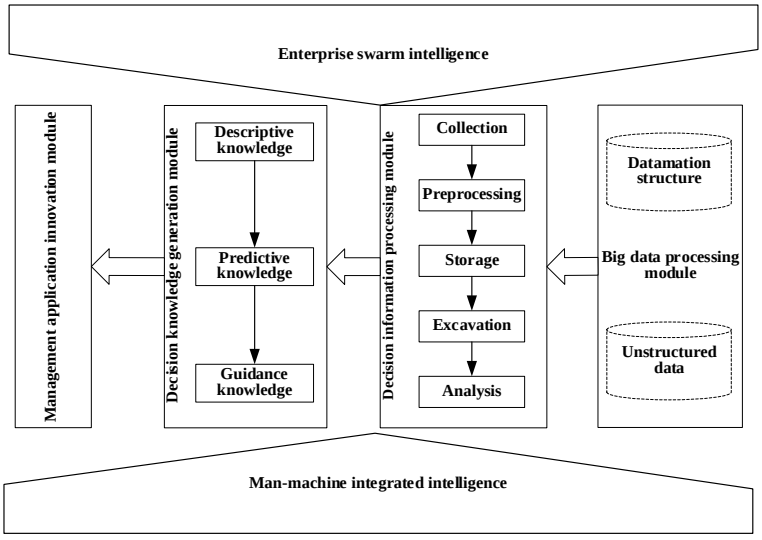

Figure 1 Design architecture of intelligent information management system

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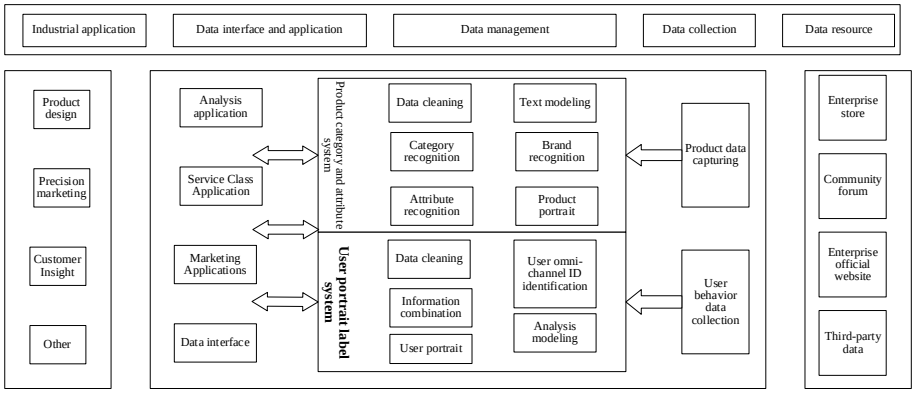

Figure 2 Structure chart of management application innovation

2.3 Design of big data processing module

Data collection, data import and pre-processing, data storage, data processing and result presentation are the processing flow of big data in the system. Figure 3 is the structure of big data processing module[5-6].

2.4 System software design

The system uses data analysis technology to discover hidden information, timely understand customer behavior and requirements, and improve product sales. Data collation and data cleansingcan fully understand customer behavior and requirements[7-8].

2.4.1 Data compilationprocess

In the process of implementing big data mining, enterprises need to sort out associated information and redundant information[7] to eliminate associated information. The specific process is shown in Figure 4.

2.4.2 Data cleaning

To reduce the size of data samples to be collected and eliminate redundant information, enterprises need to carry out data cleaning. The process is divided into three parts: cleaning the same field; cleaning fields with the same meaning; cleaning the worthless data .

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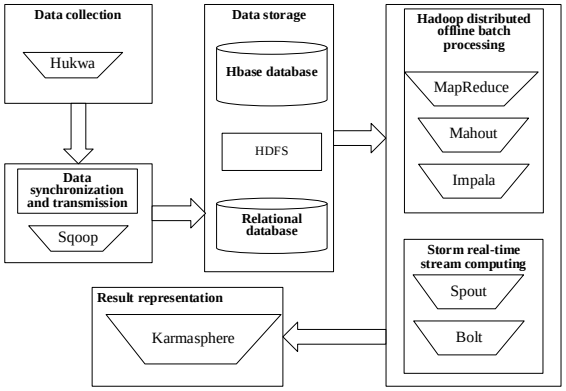

Fig.3Designof big data processing module

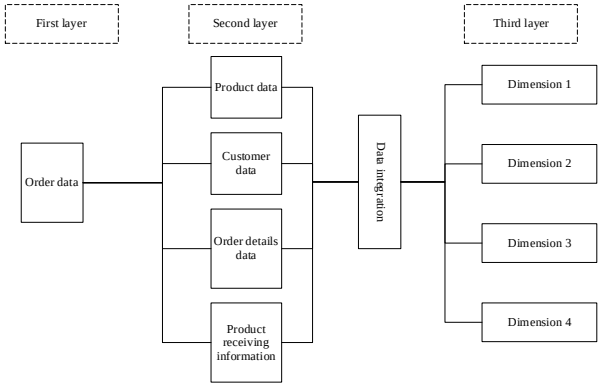

Fig. 4 Three- layer architecture of data compilation

2.4.3 Failure prediction method based on big data behavior model

When a failure occurs in the enterprise management system, it is expressed by abnormal data parameters. The data at different times and the data parameter set Y_h at a certain time h confirmed by any interference item can be obtained by monitoring the time series of data parameters. Therefore, the q-order autoregressive AR(q) model for data parameters is set as:

$$Y_h = k_1 Y_{h-1} + k_2 Y_{h-2} + \cdots + k_q Y_{h-q} + g_h \qquad (1)$$

Where the white noise is g_h, and the influence intensity of different corresponding moments on the current moment is $k_1, k_2, \cdots, k_q$. When the data state is changed or "abnormal", as the data parameter set in Equation (1) has q-order memorability, the formula will show a high deviation, which is mainly reflected by

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the change g_h .

The above process is expressed by statistical methods: the process is assumed to be a test problem, k value is non-zero, the normal distribution F is assumed to be followed by $g_1, g_2, \cdots, g_h$, and the mean and variance are assumed to be η, λ^2 , and $G(g_{h+m}) = \eta + k$, so the data anomaly should distinguish whether g_{h+m} is the same as the distribution F. The probability density function (PDF) of $g_1, g_2, \cdots, g_h$ is:

$$l\left(\eta, \lambda^2, g_1, g_2, \cdots, g_h\right) = \frac{1}{2\left(\pi\lambda^2\right)^{h/2}} \cdot \exp\left\{-\frac{1}{2\lambda^2}\sum_{h=1}^{h}\left(g_h - \eta\right)^2\right\} \quad (2)$$

Therefore, the highest likelihood estimate of η, λ^2 is:

$$\bar{\eta} = \eta; \bar{\lambda}^2 = \frac{1}{h+1}\sum_{h=1}^{h}\left(g_h - \eta\right)^2 \quad (3)$$

If the data is abnormal, η, λ^2 of g_{h+m} should be expressed as:

$$\bar{\eta} = \frac{1}{m+1}\left(k + \sum_{i=h}^{m} g_h\right) = \frac{k}{m+1}$$
$$\bar{\lambda}^2 = \frac{1}{m+1}\sum_{i=h}^{m}\left(g_h - \eta\right)^2 \quad (4)$$

Therefore, the likelihood ratio of data anomalies obtained by the hypothesis testing method of likelihood ratio test is:

$$\theta = \left[1 + \left(\frac{1}{m+1}\right)^2\left(\frac{k}{\lambda}\right)\right]^{(m+1)/2} \quad (5)$$

Therefore, the identification of data states can be obtained by continuously monitoring the likelihood ratio. On the premise of ensuring reliability, the likelihood ratio method can be used to rapidly understand

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the current situation of data and distinguish it, and predict the possible failures of the system. The advantage of the likelihood ratio method is that the data size is small and the operation is simple[10]. This method can improve the failure processing efficiency of the enterprise management system.

III. 2. EXPERIMENTAL ANALYSIS

When the proposed system is successfully developed, the experiment tests the system functionin order to prove that the functionality of the system is the same as the requirements of the enterprise. The test cases of the system are shown in Table 1.

Table 1 Test cases of the system

Test description	Expected result	Actual result	Successful
Enter your username and password, Enter the system	The system entersthe home page	Same as expected	Yes
Click Logout to exit the system	Log out and enter the login page	Same as expected	Yes
Input information Click on add	An information record is generated in the database, and an information is added during query	Same as expected	Yes
Modify the information, click Modify	The information in the database is changed, and the modified information is displayed when querying the information	Same as expected	Yes
Fill in the application for maintenance form, Click on Application	A new application appears in the application list and the application status is In Approval	Same as expected	Yes
Click Application	Application status shows In Maintenance	Same as expected	Yes

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Approval			
Click Don't Approve the Application	Application status shows not approved	Same as expected	Yes
Click Maintenance Success	Application state showsMaintenance Success	Same as expected	Yes
Enter the password of the new account, Add a System User	There is more than one user information in the database, and the account password can be used to log in to the system	Same as expected	Yes
Allocate user rights	Users can view information within corresponding permissions	Same as expected	Yes

By analyzing Table 1, it can be seen that the expected results of the system test in this paper are the same as the actual results, and the proposed system meets the needs of enterprises and has remarkable effects.

To test the operating performance of the proposed system, the proposed system, the intelligent enterprise management system based on Web network big data classification and the intelligent enterprise management system based on big data cluster architecture are used to test the system throughput and system response time in the same experimental environment. The results are shown in Figures 5 and 6.

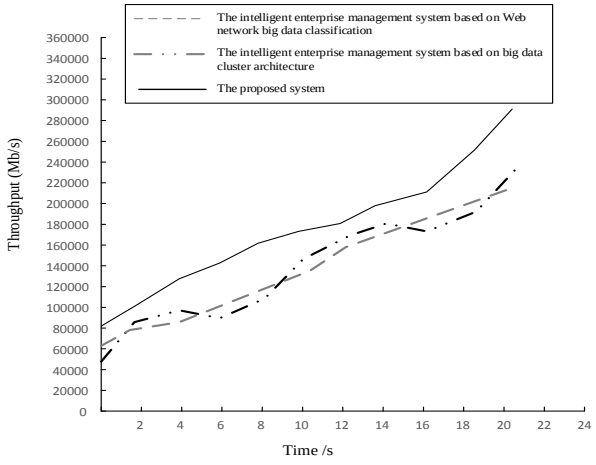

Fig. 5 Throughput of the management system

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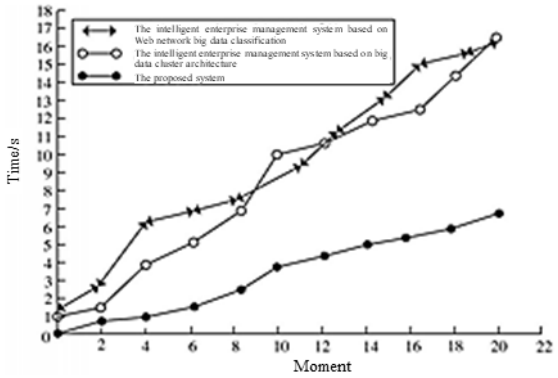

Fig. 6 Response time of the management system

According to Figure 5, the maximum throughput of the proposed system is 290 000 Mb/s. The maximum throughput of the other two systems is 230 000 Mb/s and 220 000 Mb/s, respectively, so the throughput of the proposed system is higher than the other two systems. It can be seen from Figure 6 that the average response time of the proposed system is 3.5s, while that of the other two systems is 8s and 8.5s, respectively. The average response time of the proposed systemis faster than that of other systems. These data show that the proposed system has high throughput and fast average response time, and can realize efficient enterprise intelligent management.

IV. CONCLUSION

Traditional enterprise management systems built in the network environment have poor analysis effects on big data in enterprise management and cannot improve the enterprise operation and managementefficiency. The intelligent enterprise management system based on big data is designed. The management application innovation module is adopted to realize the enterprise intelligent management application innovation through multi-screen interaction. Then the big data processing module is used for data collection, transmission, storage, and so on.Thesystem software adopts three-layer architecture to design the data collation process and eliminate associated information. The redundant information is eliminated through the data cleaning process; A failure prediction method based on a big data behavior model is used to analyze time series and realize system failure prediction. The experimental results show that the expected results of the system test are consistent with the actual results. The maximum throughput of the system is 290 000 Mb/s and the average response time is 3.5 s, indicating that the designed system can achieve efficient intelligent enterprise management.

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