Abstract. With the rapid development of big data information technology and the increasingly prominent function of management accounting, MAIS is facing more and more nonlinear decision demands. First of all, combining the era characteristics of big data, this paper makes a theoretical analysis of the construction ideas and models of MAIS. Secondly, from the interactive application layer, knowledge layer, pretreatment layer, and data layer of MAIS hierarchical structure design, the Map-Reduce calculation model is introduced to the MAIS data processing process, established the calculation and data transfer process system, and the example is analyzed by the nonlinear decision problem of the allocation of credit resources, to validate the framework model. Finally, according to the frame system, some further improvement measures are put forward in terms of information environment, technology and participants.

Introduction

Under the big data environment, information data in different fields is produced in different ways with different structure, dynamic heterogeneity and certain noise. In order to give full play to the advantages of information resources from the vast information ecology, the main task of MAIS is no longer to construct the traditional linear logic relations, but to emphasize more on the thinking change of non-linear relevance, that is, under the premise of no clear assumptions explore, the non-linear relationship between the information found that non-linear mapping knowledge, predict the future. In addition, the scope and role of management accounting in the enterprise has become increasingly prominent. In June 2016, the Ministry of Finance issued the basic guidelines for management accounting, and put forward a relatively complete operation framework from the aspects of objectives, principles and elements of business management accounting activities. In 2016, various departments jointly launched The Guidance of the Eleven Departments on Guiding Enterprises to improve their quality and efficiency. It advocated the use of information technology and other means to promote innovation and management capabilities. Big data is not only the progress of information technology, but also promote the change of enterprise management. Therefore, it is necessary to redesign MAIS non-linear hierarchical structure design and application implementation process in big data environment.

Design of MAIS Nonlinear Programming Framework

Hierarchical Structure Design

In general, the traditional AIS mainly through data storage, database and data application three-tier structure.[1]This model is mainly oriented to enterprise's own historical data and structured information, lacks external communication, and provides less support for management accounting activities. In order to give full play to the value function of information resources and improve the strategic function of management information system, it is necessary to add two levels of knowledge base and prepossessing process between application layer and data layer.

The data base of MAIS in large data environment needs not only the internal relational database, but also the information of the large data cloud platform. Since the data in the cloud platform mainly exists in a semi-structured and unstructured form, and the information relevance is relatively
complicated, it is necessary to complete the data denouncing and transformation. The data noise reduction and conversion process should first ensure the authenticity and reliability of the data. Secondly, the importance principle should be followed to screen the information of the data and remove the redundancy. The management data crowd sourcing platform is the intermediate data of internal and external data mining and filtering based on the decision objectives, which is intended to provide internal and external data support for the management activities. The knowledge layer is primarily used to store data usage models related to business management activities. The description of the model includes the definition and the use of two parts.

A Computing Framework Based on MAP Reduce

Under MAIS's four-tier structure system, the calculation of information data and the design of flow patterns between levels can draw on the MapReduce computing framework. MapReduce is a distributed computing framework that adopts a "divide and conquer" batch approach, that is, the cloud data are partitioned independently according to a certain standard to form different nodes, and each node is mapped and reduced () Parallel processing, so as to achieve business logic. [2] The MAIS data computing framework based on MapReduce is shown in figure 1.

![Figure 1. MAIS Data Computation Framework Based on MapReduce.](image)

The MAIS data calculation process should first clarify the selection of the key node of the accounting activity target. In the process of distributed parallel processing, all nodes are independent of each other, and a key node is needed to control data mining, mapping and the whole direction of protocol processing. Participants can select key points by human-computer interaction in accordance with the objectives of managing accounting activities. [3] As can be seen from figure 1, in addition to the key nodes, the MAIS data computing framework mainly contains two main processes for managing data classification mapping and managing data regulation.

The management data classification mapping process is mainly responsible for the scanning, transformation and necessary processing of cloud mass data to obtain pre-processing data related to the management accounting activities. The implementation of this process requires two assumptions: One is that cloud information is independent and can be divided freely. Second, data processing is consistent.[4] In order to ensure the establishment of the above assumptions, an effective way is to classify the data into different data areas according to the dimensions of relevance, similarity and decision-making preference after the initial mining of the cloud data. The calculation and storage operations of each node are independent of each other, and finally the intermediate result of the calculation is an intermediate value Sort, merge processing. Management data classification mapping can use MAP function to map operation.

The management data specification processing process is based on the management data classification and mapping results combined with the structured data of the local database, and according to certain standards, the protocol is processed to get information related to management activities. In order to reduce the error of the data protocol processing, the related nodes can be
divided into different node management containers according to a certain standard, and a certain level of hierarchy can be formed. Layered gradually submitted to the central processor regional node processing request, and the feedback error for the central processing unit to amend other nodes to achieve tandem level protocol processing. The regulated management data needs to be properly multiplexed and processed to form a corresponding distributed file system. It is worth mentioning that the file system is only based on information technology tools to excavate, classify, map and stipulate information data in the big data environment. The specific plan of decision plans also needs the participation of decision-makers and managers, and completes in the process of human-computer interaction.

**Realization of Nonlinear Mapping Relationship Based on BP Artificial Neural Network**

The real problems faced by MAIS, such as resource allocation, process planning and financial decision making, have exceeded the functional category of traditional accounting information system based on financial accounting and analysis. The nonlinear correlation between management accounting activities and internal and external data is more and more complicated. BP neural network is a kind of multi-layer feed forward network trained by error back propagation. It uses gradient search technology to minimize the mean square error of the actual output value and the expected output value of the network. The implementation of nonlinear programming based on BP artificial neural network requires three main steps of data mining, neural network parameter setting and simulation training. Unstructured data in big data platforms tend to have higher dimensions. High dimensions inevitably bring about high noise and increase the time and complexity of processing eigenvector data. Therefore, in the process of data mining, the most important is to establish a suitable document index structure, and to effectively reduce the dimensionality and noise reduction of the unstructured data in the big data platform through algorithms such as K-Means. The neural network setup process needs to complete the design of the neuron node and the network level. The more levels, the more nodes you need, the greater the simulation training error. Therefore, the participants can formulate acceptable error levels according to management requirements, rationally configure, the neural network level, number of neuron nodes and threshold value. The accuracy of simulation model is closely related to the sample data. The more significant the nonlinear relationship, the larger the sample size required. In general, the number of training samples is between 5 times -10 times as much as the total number of network connections.[5]

**An Example Analysis of the Allocation of Credit Resources**

Guangzhou KJ is a big toy manufacturer. In 2015, KJ began a series of technological innovations such as online toy ordering, mobile terminal marketing and payment. After that, the demand and dependence on big data is on the rise. This paper takes KJ's credit resource allocation as an example to verify the validity of the MAIS nonlinear programming framework system.

**Selection and Treatment of Sample Index**

The research shows that the credit resource allocation of KJ is mainly influenced by the four dimensions of finance, procurement and sales, information disclosure and risk control. The relevant indexes were selected respectively for the four dimensions, forming an index system matrix consisting of 16 indicators including the net interest rate of interests, percentage of sales, quality grade of information disclosure, risk coefficient and risk tolerance. Based on the platform of Tencent Cloud, this paper uses the Map and Reduce functions to mine and transform indicators such as sales percentage and risk coefficient, and combines them with the local basic financial data into an input matrix.

The target matrix, such as asset liability ratio, working capital ratio, credit turnover quota and so on, is taken as the expression of credit resource allocation. Three layers of BP neural networks are established using data from 2012 to 2015, as shown in FIG. 2.
Simulation Training and Simulation Process

After the three layer neural network is established, the train() function is used to simulate the sample data and the target matrix. The process is shown in Figure 3. After 33 iterations, the credit resource allocation BP network training error has been controlled within 10-14, reaching the expected acceptable level. It shows that the trained neural network has good function approximation effect. This network can be retained as a specific knowledge of the enterprise credit resource allocation in the knowledge base, so as to provide information support for decision-making.

The simulation process of BP neural network is used to predict the allocation of credit resources. First, the expected sample data should be determined by human-computer interaction. In order to overcome the network memory, it is necessary to generalize the new and old samples by reducing the network scale, so as to eliminate the phenomenon of "over adaptation" as much as possible. Secondly, the good target sample data will be selected and output through the sim() function on the trained neural network. Generally, When the "over fit" phenomenon occurs occasionally, we can set the acceptable level of error to terminate the simulation process in advance, so as to avoid entering the iterated iteration of the dead cycle. Using the neural network shown in Figure 2 and Figure 3 to simulate the expected sample data of 2016, the process is shown in Figure 4. After 10 iterations of the target matrix, the fitting error is close to 10-30, which is acceptable to the expected error. From this we can see that under the environment of big data, making full use of information technology and non-linear data analysis tools in MAIS's four-tier framework can well establish a non-linear mapping relationship between information data and management objectives, thus providing more information support for management accounting activities.
Conclusions and Suggestions

The Research Conclusions

Through the above analysis can draw the following conclusions: First, big data environment, structured and non-structured information form and the nonlinear relationship between management accounting information management has become increasingly complex; Second, the knowledge layer and the preprocessing layer are important components of the MAIS hierarchy framework, which is the key to internalization of external information. The calculation process of two levels of classification mapping and data specification varies according to the decision objectives and the classification protocol tools; Third, the nonlinear programming tool represented by BP neural network can effectively establish the nonlinear mapping relationship between the internal and external information samples and the target matrix, but the establishment of the nonlinear knowledge base needs full man-machine combination.

Further Improving Measures

First, we should constantly improve the ecological environment of big data information. We should encourage enterprises providing information technology services, accounting services and the third party to actively invest in the construction of accounting information ecosystem, and combine them to create an ecological environment with rich resources, unified standards and information security. The second is to accelerate the development and application of big data information technology. The information value of MAIS can be fully realized only when the information mining and knowledge discovery stage can be effectively solved. The third is to improve the level of knowledge of participants. MAIS participants should constantly improve the level of informatization and flexibly use information technology tools to obtain management-related information, they should continuously learn advanced management knowledge and make full use of quantitative knowledge models to assist management and enhance management skills as well as to maximize the role of management accounting in the enterprise.

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