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Research on Building System of Audit Evidence Integration Model Driven by Computer Big Data

Abstract: - The database, data warehouse, model base and knowledge base are initially conceived based on the existing audit decision support system, t. Standardize the data in the two aspects of database and data storage, transform all kinds of structured data into a general DSS supported data structure, and summarize the information required in the audit process and the circulating business data according to the four aspects of audit purpose, audit risk, audit evidence and audit importance. This provides data support for constructing pattern library and knowledge base. In the pattern library, the paper designs and stores common patterns, which breaks the situation that CPA relies on computer to make decisions in independent audit. Through the research of knowledge expression and reasoning mechanism, the existing examples and existing knowledge are converted into knowledge format that can be recognized by machines for easy use. The paper makes an empirical study on the audit decision support system of purchasing and payment.

Keywords: Auxiliary Audit; Decision Support System; Purchase and Payment Cycle; Big Data Driven; Model Integration

I. INTRODUCTION

In the early 1990s, China's coal sector began to develop eight functions for audit data collection, overview of the audited unit, compliance testing, audit inquiry, regulation and system inquiry, special audit, audit conclusion processing, and system maintenance. The special audit model itself has a concept of how to conduct audit assisted DSS, but because of the limitations of the industry, it is only suitable for enterprises in the coal sector, not suitable for ordinary enterprises [1]. The computer-assisted audit management system of the aviation department has made better design of the system function modules, including: the design of the financial initialization module, the design of the management system function module, the design of the general control module, the logic function design of the electronic data conversion and processing module, the logic function design of the accounting data accounting and audit processing module, and the design of some sub-modules of the audited system [2]. Audit is to conduct re-accounting and verification based on the normal business data information of the enterprise, and audit the non-conforming business again, but the system design cost of this way is relatively high.

Some scholars believe that computer-assisted audit is currently used more in internal audit, but IT has been coldly received by CPA, mainly because it is incompatible with the IT environment. Because EDP is embedded in EDP, and with the change of EDP, the application of CAT has changed accordingly [3]. Since the computer-assisted review only accepts past data, the opportunity for cheating is greater. Some scholars define it as audit database, audit pattern library and dialogue management system. Among them, the audit expert system is composed of knowledge base, database, reasoning machine, knowledge acquisition and acquisition mechanism, and human-machine interface. It can imitate the thinking and reasoning of auditors in the audit process, so as to realize an intelligent audit decision support system [4]. The four database architectures used in this paper are derived from such a set of expert audit system. This paper introduces the concept of data warehouse, and puts forward a DSS model based on Client/Server, which aims to provide audit means for auditors.

II. OVERALL STRUCTURE OF AUDIT DECISION SUPPORT SYSTEM

This paper presents four architectures based on database: data warehouse, database, model base, knowledge base and user interface. Its main manifestations are as follows: (1) Due to the openness of DSS, auditors have a high degree of participation in the operation process of enterprises. Therefore, by building a knowledge base, audit experience can be accumulated and communication between peers can be facilitated. (2) There is usually a long-term cooperation between accounting firms and auditees. Through the construction of data warehouse, accounting information of auditees over the years can be mined and drilled out to help them have a deeper understanding of the real operation of auditees, identify important problems and key audit areas, and thus reduce

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audit risks. Figure 1 shows the architecture of the audit Decision Support system (image cited in Knowledge Based Modeling of Financial Decision Support Systems).
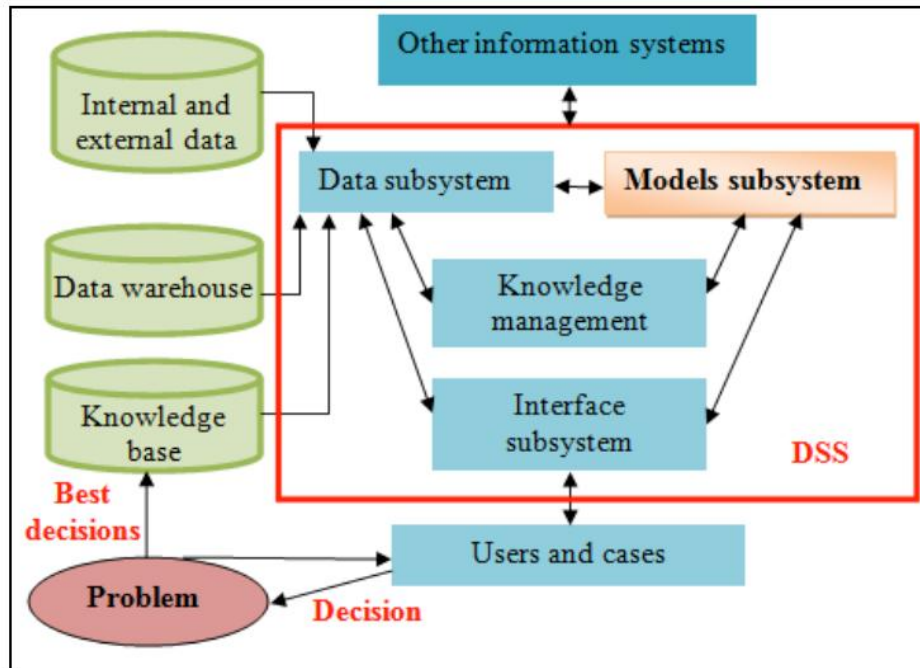

Fig.1 Structure of audit decision support system

A financial analysis method based on prototype method is proposed. Through the analysis of system inspection, the architecture of DSS with better auxiliary audit function is improved. Judging from the current development of science and technology, I think a complete audit decision support system can be gradually developed for small and medium-sized accounting firms on the premise of meeting the needs of CPA analysis and decision based on two database systems, database and pattern database, instead of building data warehouses when making audit decisions [5]. The "four repositories" of large-scale accounting institutions are based on database, data warehouse, model base and knowledge. Starting from the "four repositories", this project extracts, analyzes and summarizes audit data to obtain sufficient and appropriate audit evidence to provide decision-making support for CPA's financial management and financial management.

III. DATABASE SYSTEM DESIGN

For CPA, it is a very important working platform, which can help CPA extract data from data warehouse, model library and knowledge base for audit. In addition, for CPA, it is also a database for integrating audit materials and collecting audit evidence. Therefore, in the audit process, the design of the database is very important [6]. In the audit of accounting statements, most of the data of certified public accountants come from the outside world, and their work is also centered on the audited accounting data. Therefore, in the database of the audit decision support system, most of the data comes from the audited accounting data of the audited year. This requires the database management system not only to manage its own data, but also to manage the audit year accounting data of the audited enterprise.

A. Implementation of database interface

The annual accounting data of the audited enterprise is external data, and the interface of the data is very important when the data is input. Data interface is an interface for data transmission and exchange in the form of electronic documents. The audit interface refers to the standards and processes that transfer audit data from the auditee to the audit application [7]. The platform is a link between the auditee's financial information and the audit support information. According to the characteristics of external audit work and its own characteristics, the data interface is required to adopt universal and periodic interface. Because independent audit is separated from the auditee, the audit is generally carried out in a specific period of time, which requires the data interface of the audit decision support system to be regularly transmitted to the accounting information of the auditee. Accounting firms need to provide various services for multiple customers, and there are great differences in the accounting information system of the audited party, so there must be a strong universality when converting various data in each accounting information system [8]. The audit interface can collect and transform information

in the audit process. Data collection is to copy the audited person's data to the audit decision support system, and the data conversion converts the auditor's data into a general data type to facilitate the audit DSS identification.

B. Storage Structure Design

A method based on multiple data units is proposed to realize the research of this method. A data element that is defined, identified, represented, and allowed by a set of attributes. It is an indispensable basic unit. It is a data generated by the data interface in accounting software [9]. The object of external audit is the auditee's production and management behavior, and can reflect the auditee's production, business behavior and other aspects of information. With the evolution of accounting from manual accounting to computer accounting, the media of data recording has also changed from the original paper to the form of magnetic media, and the audit clue has been lost, and the original relationship between accounts, certificates and tables has lost its effect. Therefore, for certified public accountants, it is necessary to establish an audit clue based on "magnetic media". It is necessary to establish a complete set of data structures that can be traced back to the "magnetic media". By establishing an audit data storage framework, this study enables CPA to quickly grasp the methods applied to magnetic media audits. After determining the structure of audit data, audit clues are locked into common fields and displayed in each relationship table [10]. Because the effect is very direct, CPA can treat the auditing in the computer environment as an audit skill or skill to master. The data storage structure for database auditing is listed in Tables 1 and 2.

Table 1 Storage structure of database audit data (purchasing service)

serial number	Field name	Field meaning	Data type	Breadth
1	GHYUBH	Purchase business number	Character type	10
2	QGDBH	Purchase requisition number	Character type	10
3	DGDSP	Purchase order approval	Logical type	2
4	DGDBH	Purchase order number	Numerical type	10
5	HTSP	Contract approval	Logical type	2
6	GHHTBH	Purchase contract number	Numerical type	10
7	YSDBH	Receipt number	Numerical type	10
8	MFFPBH	Seller's invoice number	Numerical type	10
9	MFDZDBH	Seller's statement number	Numerical type	10
10	JZSJ	Bookkeeping time	Date type	10
11	PZLH	Certificate link number	Logical type	2
……	……	……	……	……

Table 2 Database audit data (payment transactions) storage structure

ID	Field name	Field meaning	Data type	Breadth
1	ZPBH	Check number	Numerical type	10
2	ZPSP	Check approval	Logical type	2
3	PZZX	Certificate cancellation	Logical type	2
4	FKRZSJ	Time of payment entry	Date-time type	10
……	……	……	……	……

In the past independent audit, the requisition form could not be arranged in order. In order to facilitate the CPA to conduct a comprehensive audit of the purchase matters, the serial number was adopted in this paper. The order number can be numbered according to the order of purchasing department and purchasing business, and T means approved, WT means unqualified, and the purchase record is complete. The purchase order number is required to be the same as the purchase number with T except for the purchase department number. The audit evidence storage structure in the database is shown in Table 3.

Table 3 Audit evidence storage structure

ID	Field name	Field meaning	Data type	Breadth	Integrity constraint
1	ZJBH	Evidence number	Numerical type	10	Primary key, not empty
2	ZJLY	Source of evidence	Character type	10	non-null
3	ZJLX	Type of evidence	Character type	10	non-null
4	XGRD	Relevant identification	Character type	10	non-null

As can be seen from the above table, the structure of audit data storage is closely related to the characteristics of audit operations, and the data storage structure is to present the key points and points of audit work in a two-dimensional table. In the Audit Assistance System database, the data storage framework based on audit is different from the financial reporting framework in which the audit is the narrative object and the audit is the presentation object. In the audit decision aid system, the audit results are displayed in memory [11]. In the audit process of the purchase and payment cycle, the audit evidence is summarized according to the accounts, which

not only facilitates the CPA to investigate the adequacy and sufficiency of the audit evidence, but also facilitates the comparison with the audit risk and the audit conclusion.

C. DBMS development

In addition to the data query ability of ordinary DBMS, it also contains specific functional modules suitable for audit work, in the process of audit, you can also use data warehouse, model base, knowledge base and other related data, models and knowledge. The database management module consists of data authenticity verification, internal control analysis, risk analysis, evidence collection, result analysis, customized overall analysis, audit tools, audit technology and other modules.

a. Data accuracy verification module

Audit the authenticity of each certificate of the audited party, ensure the strictest operation of the "accounting software" used by the audited party, check whether there are any illegal changes, and check the balance of the account information generated after re-accounting and summary. Check the continuation of the audited enterprise's financial annual accounting data, and whether there are illegal changes to the beginning of the period without passing through the accounting vouchers [12]. Verify the rigor of the accounting and statistical data of the audited institution, verify whether it is generated or artificially added to the system, whether there are program defects, and whether there are programming personnel to change the historical data. Check the data in the general ledger and sub-ledger for data errors due to power outages, software version updates, etc., as well as cases of computer cheating, such as the person being audited making artificial changes to the account database.

b. Analytical model of internal control system

The auditee's internal control process and audit process are attached to assist CPA in making decisions. The model is connected with the business characteristics database of the enterprise, and the business characteristics of similar enterprises are compared and analyzed [13]. The similar situation here refers to the business environment of the same enterprise, for example, in the case of immediate sales. The internal control module group can not only evaluate the internal control design and implementation status of the audited organization, but also grasp the possible weak links of the internal control of the audited party, so as to comprehensively analyze and eliminate them.

c. Audit risk module

The audit risk model is mainly used for quantitative description of audit risk in audit, which involves internal control module, audit evidence module and audit effect. The audit risk model is connected with the model library and data warehouse, and the historical data of the audited enterprise and related risk data of similar enterprises are input into the internal control analysis of the enterprise's internal control, so as to collect audit evidence and judge the audit conclusion.

d. Audit evidence module

In this paper, a new method of information retrieval based on network is proposed. By connecting the audit evidence module to the model base and knowledge base of the audit decision support system, the required audit model and knowledge can be used at any time, while the audit evidence module is connected to the data warehouse, and the number of industries related to the auditee and past information can be queried to help the CPA identify audit risks [14]. And determine whether it is sufficient and appropriate. In the audit evidence model, the audit evidence is saved in 2D form, and sorted according to the certificate number, which is convenient for retrieval and integration.

e. Customize the Overall Analysis Module

This module connects to the pattern library, and by retrieving existing audit data, it can be applied to the entire report and account, and the obtained audit evidence is analyzed and identified as potentially high-risk areas.

f. Audit audit module

This unit focuses on the audit of specific accounts and business accounts, including various current accounts, ledger, tax statements, etc., and by setting screening criteria, identifies key audit areas and finds problems in them. Audit Audit has its own specific purpose, and the audit method for one subject is not necessarily applicable to other subjects, which requires the professional judgment of the auditor.

g.   Audit prompt module

This paper mainly introduces the audit work of CPA. Audit skills and database are connected, certified public accountants through the search of audit problems, can find the method of audit, should pay attention to the problem and its corresponding phenomenon.

D.   Development of Data Warehouse

A complete data warehouse contains all the elements of establishment, management and use. From the architecture can be divided into: data source, data warehouse, warehouse management and data analysis. In this integrated system, a data source provides a source for the data warehouse. As the center of the system, but also a data entity carrier, he will come from the data source of all kinds of data into the form provided by the data warehouse, after cleaning, screening, can be extracted from the data warehouse and loaded into the data warehouse [15]. The main content of data warehousing is to store, archive, backup, maintain and restore data safely. Front-end tools are mainly based on various analysis tools to realize various query and retrieval tools, multidimensional data analysis tools, data mining tools and reporting tools to provide assistance for decision-making.

a.   Design of Data Warehouse

The scope of DSS management of enterprises is divided into two parts: one is to carry out internal control inspection, and the other is to carry out entity inspection. In the internal control measurement, the data from the data source should be linked to whether the internal control of the audited organization is complete and effective: accounting information system data, internal audit data, internal control data, internal communication data and external information related to it. In the entity inspection stage, the amount or balance of each account in the purchase and payment cycle of the year audited by the audited entity shall be analyzed according to the information of the audited entity, the information of the same industry, the information of inter-industry exchange, the information of audit cases, the information of business characteristics and the relevant external information, so as to determine whether the audit risk is within the acceptable range [16]. If not, the audit risk shall be within the acceptable range. Collect audit evidence again until a conclusion is reached that can be accepted by the CPA. Therefore, when carrying out two different periods, different data should be comprehensively processed. The overall design of the audit decision support system data Warehouse is shown in Figure 2 (image cited in Understanding Warehouse Management Systems).
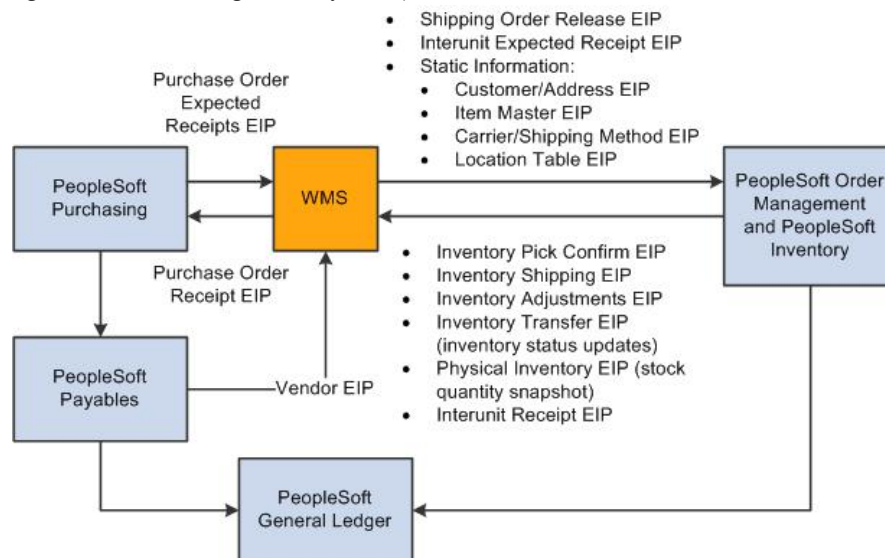

Fig.2 Overall design of the purchase and payment cycle audit data warehouse

A complete data warehouse conceptual model is based on the conceptual model described above, packet diagram and other design means to achieve. Packet graphs are used for complete and standardized analysis of data. The work done in this paper is as follows: to determine the scope of the subject in this system. Track the implementation status of major projects and project implementation. Determine how data is delivered to data warehouse users. Build a data hierarchy. Estimate the size of your data warehouse. Decide how often to update data in the data store [17]. The data package diagram for the purchase and payment cycles is shown in Table 4 below. Because the scale covered by the information package diagram is larger than 3D, it cannot be expressed in charts, so the specific content included in the information package diagram can be expressed in the form of tables,

and the spatial structure of the information package diagram can be described according to the information listed in the list. The dimension bar is a topic area in the data warehouse. These topics are both independent and interrelated. One category explains the main characteristics of each topic, while the category of the same topic is a parallel relationship. They are independent of each other, and there is no special norm or requirement for classification. From the point of view of building an entity model and querying data, this paper recommends that attributes related to keywords be placed first.

Table 4 Packet diagram of the system

dimensionality category	Time	All accounts	Audit objective	Audit evidence	Audit risk	Importance level
Category 1	years	Account name	Global rationality	Evidence number	Inherent risk	Report level
Category 2	season	Account number	authenticity	Source of evidence	Control risk	Account hierarchy
Category 3	month	Nature of account	integrity	Type of evidence	Inspection risk	
Category 4	weeks		ownership			
Category 5	day		appraise			
Category 6			Up to			
……			Mechanical accuracy			

In data warehousing, several common models include snowflake model, star model, three-normalized model and so on. A new model of star structure is proposed, which can greatly accelerate the speed of retrieval. Because the audit process involves a lot of data operations and queries, which are usually retrieved in the form of reports, it is more suitable for the star mode [18]. The conceptual model design specifies the subject area of the data warehouse, that is, the relationships between entities. In the design of the logical model, each topic extends to its own middle-tier model according to the corresponding properties.

b. Development of on-line analytical processing system

OLAP, also known as online analysis process, is a data-oriented interactive support method. Through fast, consistent and interactive access to a variety of different perspectives, analysts and managers can better understand the "dimensions" from the source data, and thus better understand and grasp the essential characteristics of things. OLAP is to process massive data, convert these data into valuable data for enterprises, and then summarize, analyze and process to assist enterprises in management. OLAP provides more information to end users and better support for enterprise decision making.

Multi-dimensional data mode is the premise of building OLAP system, that is, data is stored in multi-dimensional mode. Dimension is to look at a problem from a perspective, and the advantage of multidimensional is that you can organize, organize and analyze data in the way you like. Multidimensional data storage is divided into two categories: relational online analysis processing and multidimensional online analysis processing. ROLAP is an OLAP built in a relational database that maps multidimensional data into a two-dimensional associative table, typically stored in a "star pattern" format, storing the basic information in a separate "fact table", storing the dimensional-related supporting information in other tables, and copying it to a set of tables dedicated to multidimensional access applications [19]. Each table requires a keyword to be identified and efficiently accessed using an index. Compared with ROLAP's two-dimensional storage mode, MOLAP is more inclined to three-dimensional storage, that is to say, as the dimension expands to 3 or higher dimensions, the multidimensional database will present the structure of "hypercube" blocks, and compared with ROLAP, MOLAP's index is lower, and only a smaller number is needed to identify the corresponding data. Therefore, it has higher retrieval efficiency. In the constructed data model, this paper sees audit objectives, audit evidence, audit risk and audit importance in four aspects, and further details the three levels of time, audit account and industry. Figure 3 shows the OLAP associated with auditing DSS (image cited in Energy-Efficient Technologies for High-Performance Manufacturing Industries).

c. Model design

Usually a complete model library system is composed of model library, dictionary, internal library and model library management system. the pattern library Is shown in Figure 4 (the image is referenced from Decision Support System Is a Tool for Making Better Decisions in the Organization). It is used to store mappings between

different schemas and data. The model library organizes and saves a large number of models according to the specific structure format, and uses the model library management software to extract, access, update and merge each model, so as to achieve the purpose of efficient management and utilization. A semantic-based modeling method is proposed [20]. Among them, the data extraction of the model is the description of the data access, so as to realize the automatic access to the data in the database. The establishment and maintenance of the model base, as well as model invocation, query operation, inspection and evaluation have strong application value.
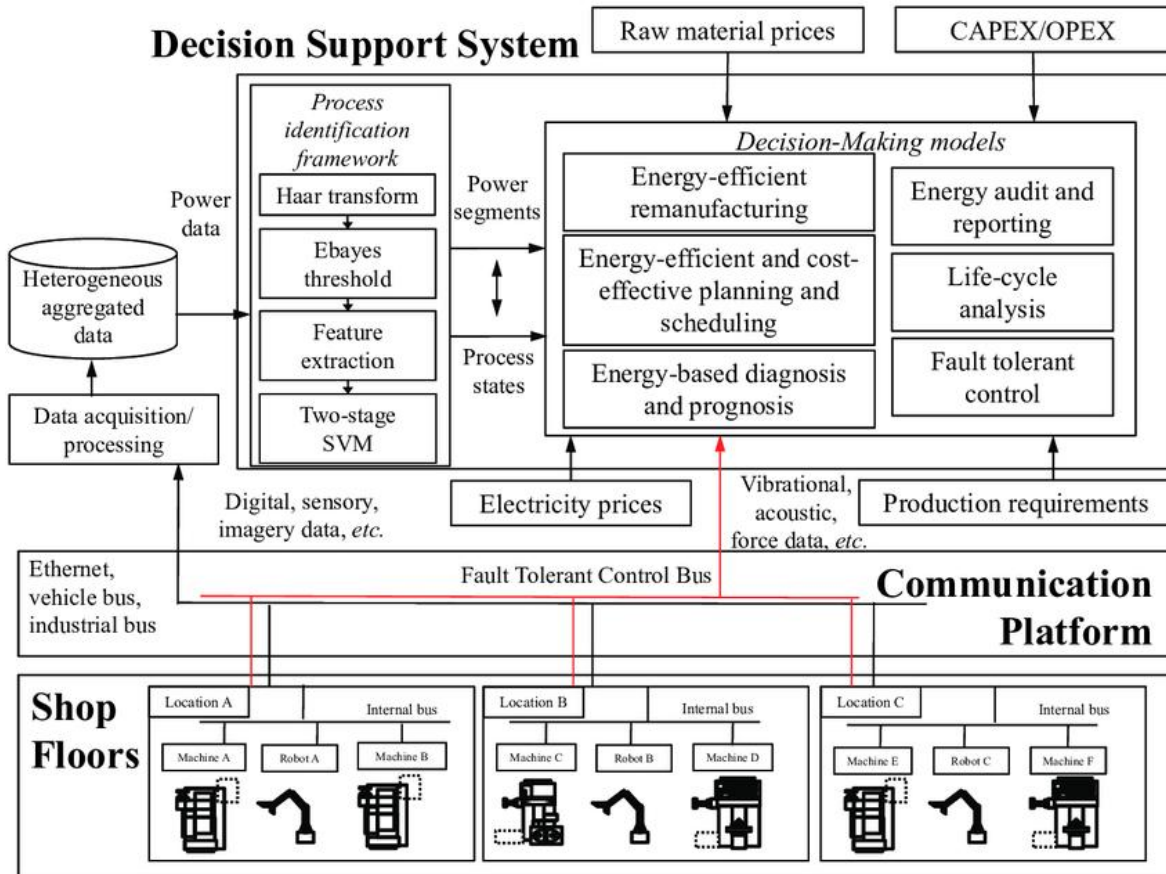

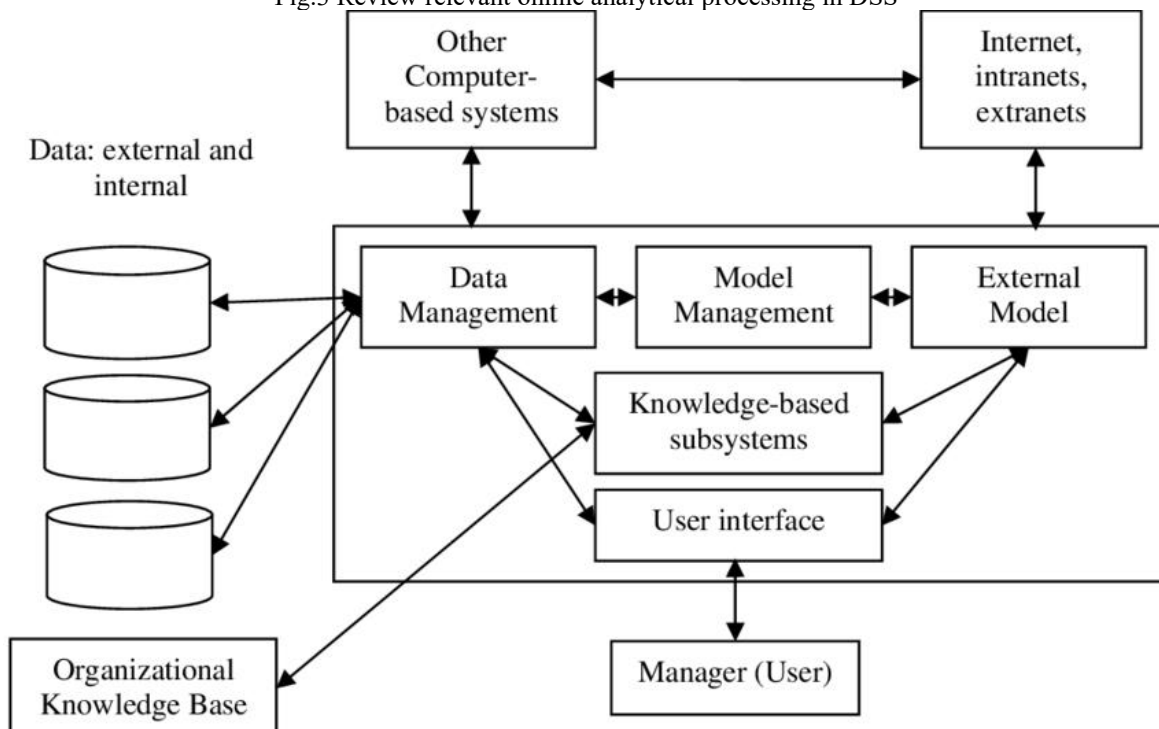Fig.3 Review relevant online analytical processing in DSS

Fig.4 Model base system composition diagram

Audit the accounts and operations related to the purchase and payment cycle, which can be divided into three stages: planning, execution and completion. In the planning stage, it is necessary to have a general understanding of the basic information of the audited institution, conduct an initial assessment of the internal control status of the audited institution, determine its importance, and conduct risk analysis, so as to determine the key areas of the audit. In the process of audit implementation, it is necessary to collect and evaluate the information of various accounts or transactions according to the scope, key points, steps and methods determined in the planning stage, so as to achieve the purpose of audit and obtain the results of audit [21]. Finally, the collected data are integrated, the review opinions are written, and the relevant reports are published. Among them, the first and second stages are the focus of the audit work, including two parts: one is the audit test, the other is the collection of audit evidence, the definition of the audit scope and the generation of audit conclusions. The model built by the model library is based on data and knowledge storage and inference to help the CPA make correct judgments. The functional structure of the model library System is shown in Figure 5 (the image is referenced in Resource-constrained Multi-Project Management - A Hierarchical Decision Support System).
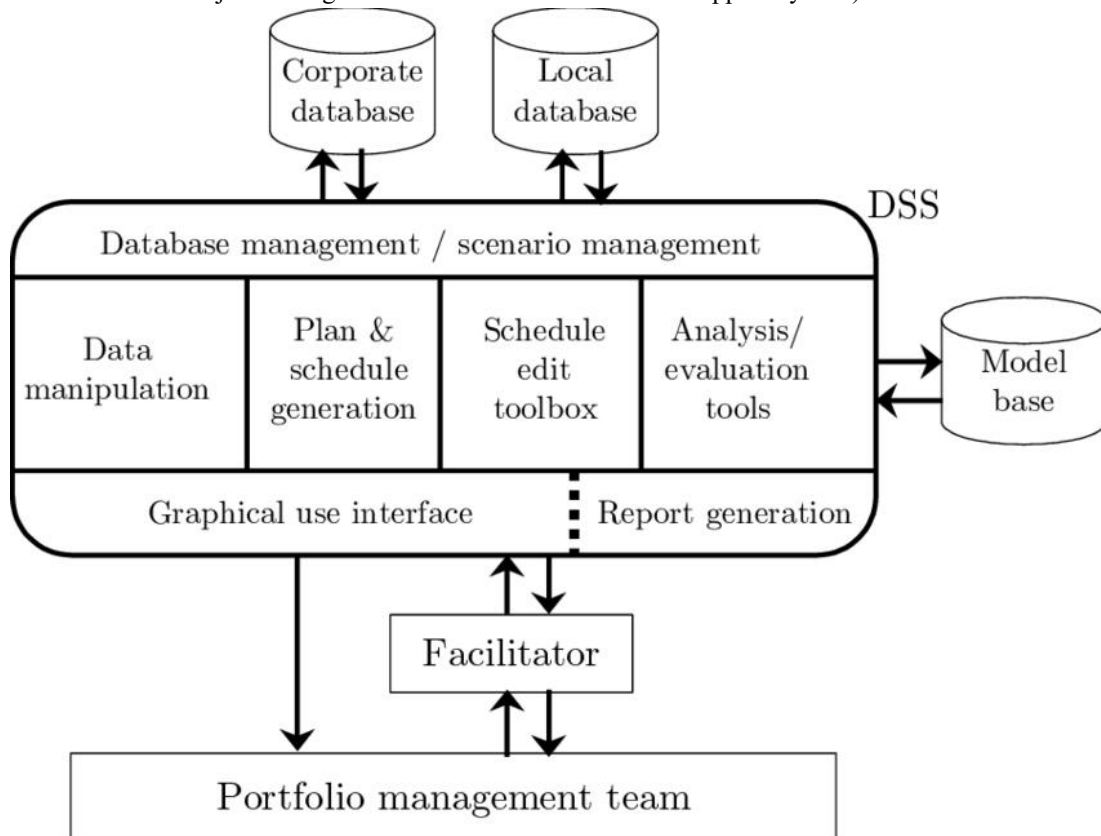

Fig.5 Design diagram of overall functional structure of model base

IV. CONCRETE IMPLEMENTATION OF THE MODEL

A. Audit evidence acquisition and quantitative conversion

The mass function assigns a confidence to all propositions. Considering qualitative evidence first, in order to describe the reliability of the system, a set of evaluation levels is given:

$$G = \{G_1, G_2, G_3, G_4, G_5\} \tag{1}$$

Let $R = \{r_1, r_2, \cdots, r_M\}$ be M index to judge the reliability of an information system, then the degree of support of a certain evidence to the reliability judgment of its supported index $r_i(i = 1, 2, \ldots, M)$ can be expressed as:

$$Q(r_i) = \{(G_n, \gamma_{n,i}) \mid n = 1, 2, \ldots, 5\}, (i = 1, 2, \ldots, M) \tag{2}$$

$\gamma_{n,i}$ indicates the degree of trust and satisfies $\gamma_{n,i} \geq 0, \sum_{n=1}^{N} \gamma_{n,i} \leq 1$. This means that, based on audit

evidence, the reliability of indicator r_i is rated at grade G_n to the degree of $\gamma_{n,i}$. When $\sum_{n=1}^{N} \gamma_{n,i} < 1$ is called

incomplete evaluation. $\sum_{n=1}^{N} \gamma_{n,i} = 1$ is called a complete evaluation. Quantitative evidence can also be converted

to the form (1), where $y(r_i)$ is the data value of r_i. Suppose that the equivalence rule provided by auditors

according to industry norms or auditing experience is equal to $[g_{n,i}^-, g_{n,i}^+]$ and G_n, that is, the auditor believes

that for specific indicators, the quantitative data can be rated at what level within what interval value. There are

two possibilities:

$$g_{n,i}^- \leq y(r_i) \leq g_{n,i}^+, \gamma_{n,i} = 1; \gamma_{k,i} = 0(k \neq n).$$

$$g_{n,i}^+ \leq y(r_i) \leq g_{n,i}^-, \gamma_{n-1,i} = \frac{y(r_i) - g_{n-1,i}^+}{g_{n,i}^- - g_{n-1,i}^+}.$$

$$\gamma_{n,i} = \frac{g_{n,i}^- - y(r_i)}{g_{n,i}^- - g_{n-1,i}^+}; \gamma_{k,i} = 0(k \neq n-1, n).$$

Therefore, both qualitative and quantitative evidence obtained through audit can be expressed in the form of formula (2), which allows the assessment of system status based on trust structure under the condition that some evidence is missing.

B. System reliability assessment based on audit evidence

At present, a large number of audit evidence can truly reflect the operation of the current system. Therefore, how to effectively analyze and evaluate the data contained in a large number of audit evidence, some scholars have proposed an evidence inference algorithm based on Dempster-Shafer. A variety of criteria are used to determine the quality value of audit evidence, and the combined operation and discount operation of ass function are used to describe the supporting effect of multiple audit evidence at different time points on the credibility level of the system. Figure 6 is an architecture for a reliability-oriented information system audit basis (image cited in Appl.Sci.2021, 11(11), 4751).
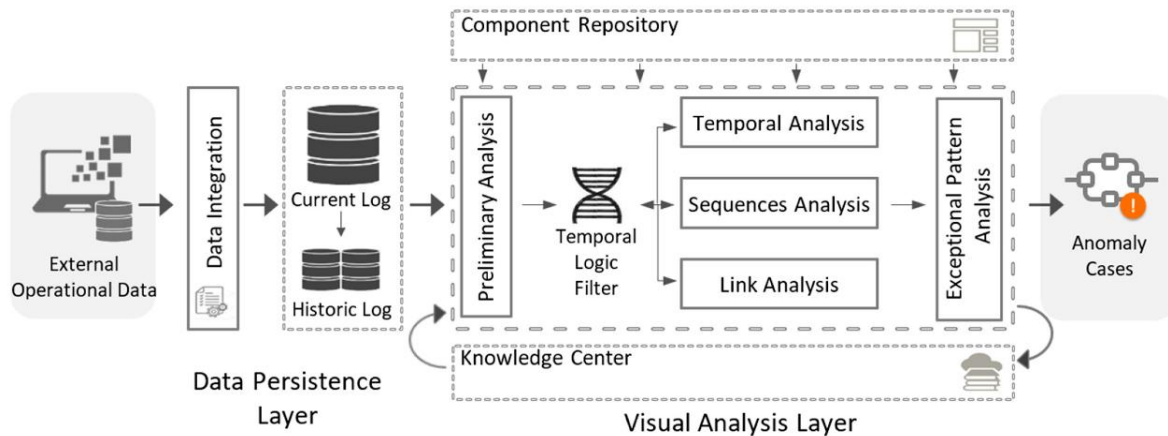

Fig.6 Framework of information system audit evidence analysis for reliability prediction

Suppose there is A series of measurable values $(U(t_m), v(t_m))(n = 1, 2, \ldots, N)$ for a system, where

$U(t_m), v(t_m)$ represents the input value and the corresponding output value of the system at time t_m,

respectively. In system reliability prediction, consider:

$$\hat{v}(t) = Y(v_{t-1}, v_{t-2}, \mathrm{K}, v_{t-q}) \tag{3}$$

Where $\hat{v}(t)$ represents the predicted value of the system at time t, and $v_{t-k}(k = 1, 2, \ldots, q)$ represents the

real output value of the system at q moments before time t. Since the output of the system at the next stage is

based on the output at the current stage, and the output at the current stage is determined by the input of the system and the operating state of the system, if $Y(\cdot)$ in equation (3) can be determined, the operation of the system at the next time node can be predicted according to the judgment of the system operation in a period of time. In this study, the reliability of the system at the first several times can be used as evidence for the reliability prediction of the system at a certain time in the future, and these evidence can be used as the input of reliability prediction to predict the reliability of the future system operation [22]. Suppose $(v_{t-1}, v_{t-2}, \ldots, v_{t-q})$ is q inputs that can be used to predict system reliability $\%(t)$ at time t, and λ_k represents the weight of $v_{t-k}(k=1,2,\ldots,q)$. It can be proved that the predicted output value of the system at time t is expressed as:

Among

$$P(\%(t)) = \{(G_n, \%_n(t), (G, \%_G(t)), n = 1, 2, \text{K}, 5\} \tag{4}$$

$$\%_n(t) = \frac{\prod_{k-1}^{q}(\eta_k\gamma_{n,k}(v_{t-i})+1-\eta_k+\eta_k\gamma_{G,k}(v_{t-k})) - \prod_{k-1}^{q}(1-\eta_k+\eta_k\gamma_{G,k}(v_{t-k}))}{S(t)} \tag{5}$$

$$\%_G(t) = \frac{\prod_{k=1}^{q}(1-\eta_k+\eta_k\gamma_{G,k}(v_{t-k})) - \prod_{k=1}^{q}(1-\eta_k)}{S(t)} \tag{6}$$

$$S(t) = \sum_{m=1}^{M}\prod_{k=1}^{q} \frac{(\eta_k\gamma_{n,k}(v_{t-i})+1-\eta_k+\eta_k\gamma_{G,k}(v_{t-k})) -}{(M-1)\prod_{k=1}^{q}(1-\eta_k+\eta_k\gamma_{G,k}(v_{t-k})) - \prod_{k=1}^{q}(1-\eta_k)} \tag{7}$$

From formula (5) to formula (6), it can be seen that $P(\%(t))$ establishes the correlation between $(v_{t-1}, v_{t-2}, \ldots, v_{t-q})$ and $\%(t)$, that is, determines $Y(\cdot)$ in formula (4). For further discussion of this prediction model, there are still two problems to be solved: one is the parameter problem in the model. The second is how to determine $\%(t)$ based on $P(\%(t))$.

For the first problem, formula (7)~(9) $\eta_k(k=1,2,\ldots,q)$ reflects the correlation between system reliability at time t and system reliability at time q $(t-1, t-2, \cdots, t-q)$. If these parameters are set subjectively only by expert knowledge, they will directly affect the accuracy of model prediction. Genetic algorithm will be used in this study to determine these parameters. Since the reliability of the system at time t can also be determined by the same method used to judge the reliability of the system at time q, the real value of the system at time t can be obtained, so that a large number of real values can be obtained to modify the parameters before the parameters of the prediction model are really determined. Assuming that there are M true values of system reliability $P(v(t_m)) = \{(G_n, \gamma_n(t_m), (G, \gamma_G(t_m)), n = 1, 2, \cdots, 5\}(m = 1, 2, \cdots, M)$ that can be used for parameter training, a multi-objective optimization model is constructed:

$$MinMax\left\{\frac{1}{M}\sum_{m=a}^{M}(\gamma_n(t_m) - \tilde{\gamma}_n(t_m))^2\right\} \tag{7}$$

$$s.t. \sum_{k=1}^{q}\lambda_k = 1 \tag{8}$$

$$0 \le \eta_k \le 1, k = 1, 2, \ldots, q \tag{9}$$

The meaning of the above optimization model is to minimize the deviation of M actual $\gamma_n(t_m)$ and predicted $\%_n(t_m)$ under the constraints of η_k. This model can be solved by using the FMINMAX function of MATLAB software.

For the second problem, the predicted value $P(\%(t))$ of system reliability obtained by equation (6) is an evaluation distribution based on trust structure. It is difficult for system maintenance personnel to intuitively

judge the description of such scattered levels, and it is also difficult to compare different prediction results. The expected utility theory is used to convert $P(\%(t))$ into a numerical representation.

V. CONCLUSION

At present, DSS has been widely used in construction, business, marketing, finance, management, flood control, power and other aspects. Although computer has been widely used in audit, but its theory has not been applied to audit work, so the purchase and payment cycle audit assistant decision support system proposed in this paper is just to achieve this goal. The financial management system structure of "four libraries in one" has been established. The four-base system consists of four parts: database, data warehouse, model base and database. The database is the operating platform of CPA. By constructing a consistent data structure, it realizes the summary and analysis of the audited enterprise's accounting information for many years. This paper introduces the multi-dimensional data analysis method based on model library and model library, which lays a foundation for the current situation of using computer for decision support in independent audit of CPA. A large amount of knowledge as well as case knowledge is stored in a separate audit process.

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