Research on the improvement of accounting work quality of new agricultural business entities under the background of big data

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ABSTRACT
The accounting of the performance of the new agricultural business entity and the choice of future strategic planning are all directly affected by the quality of its accounting work. Therefore, it is very important to strengthen the accounting supervision of the new agricultural business entity. This article combines big data technology to construct an accounting work quality improvement model of the new agricultural business entity based on big data, uses a clustering algorithm to process a large number of accounting work data of new agricultural business entities and reengineers the inherent expense reimbursement process. In addition, this article builds an expense control module and an image module in the system and integrates the general ledger module with multiple modules such as fund management and payable salary, so that the financial data information of the new agricultural business entities can be processed, summarised and analysed quickly and efficiently in the financial sharing service system. The experimental research results show that the new agricultural business entity accounting work system based on big data technology constructed in this article can effectively improve the accounting work quality of the new agricultural business entity.

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Introduction
The new agricultural business entity was created with the development of my country’s agricultural economy. Generally speaking, an agricultural business organisation with a relatively large scale, complete equipment and standardised business management system is called a new agricultural business entity. Large-scale agriculture is also known as industrial agriculture, in which both plants and animals yield high inputs and outputs based on agricultural land area. The types of machineries used in the modern agriculture are power harrow, water browser, ripper machine etc. With the improvement of social productivity, large-scale agricultural machinery and equipment such as combine harvesters, planters and subsoilers, as well as modern agricultural technology such as drones for pesticide spraying and intelligent sprinkler irrigation systems are increasingly used in agricultural production. Agricultural production is the utilisation of crops and animal products to sustainably improve human living. Foods, fuels, textiles and raw materials are the four categories. Crops and animal products are used to produce food, animal feed and non-food goods for human use.

However, there is a contradiction between the use of advanced production technology and the land fragmentation brought about by the household contract responsibility system in my country. Under the vigorous promotion of the Chinese government, the new agricultural business entity with agricultural production cooperatives, large planters and large breeding households as important components has effectively reduced the contradiction between modern agricultural production and land fragmentation and has played a major role in increasing the income of farmers and increasing the scale of my country’s agricultural production. Therefore, the new agricultural business entity has played an important role in realizing the new momentum of my country’s agricultural and rural development. An agricultural business is also called as agribusiness, in which production, management and the agricultural commodities are analysed. The fields involved in the agricultural business are sales, faming, conservation, ranching and resource management (Wright et al. 2019).

Compared with large foreign agricultural chain companies Archer Daniels Midland’s and Bunge, China’s new agricultural business entity does not have an...
advantage in terms of scale and management system. Although it has achieved rapid development with the support of the Chinese government in recent years, there are still some problems in the management system of the new agricultural business entity, which is mainly composed of small and medium-sized agricultural enterprises in agricultural cooperatives and family farms. In particular, the quality of accounting work is not high, which has become a bottleneck restricting the standardised development of my country’s new agricultural business entity, and has also affected the pace of my country’s new agricultural business entity participating in global competition (Girchenko and Kossmann 2017).

Accurate accounting and disclosure of accounting information are essential to the healthy development of new agricultural business entities (Olson and Levy 2018). However, at present, the completeness of accounting information of some new agricultural business entities in our country is insufficient. Based on big data technology, this article combines data mining algorithms to build an accounting intelligent system that can be applied to the new agricultural business entity, so as to improve the accounting work quality of the new agricultural business entity.

The performance of new agricultural business entity having certain impacts in its performance quality. So, this article uses big data technology to develop the model to improve the quality of the new agricultural business entity. Meantime, clustering algorithm is used to analyse huge amount of data and to characterise expense reimbursement process.

Related work

Mulima Chibuye and Jackson Phiri (2017) used the item method to construct an accounting information system and provided various unprocessed original items related to the decision-making model for the information demanders to choose and use. Chunyong Yin et al. (2019) proposed to build an accounting information system under an event-driven mechanism. The event-driven mechanism is a more practical and innovative model, which is a subversion of traditional accounting work. This mode is characterised by the integration of information processing and powerful functions in data collection, sorting and analysis. Pietro Ducange et al. (2018) proposed to build an accounting information system based on government resource planning. This system is based on the development results of the event method and event-driven mechanism model, and mainly focuses on how to construct an efficient accounting information system during the process of business occurrence. Pedro Palos-Sánchez et al. (2018) proposed that under the background of the rapid development of the Internet and e-commerce, the emergence and development of network-based accounting information systems has become an inevitable trend.

Lena Steinhoff et al. (2019) proposed to continuously expand the financial accounting information system into a system that supports business decision-making and expand the database that only supports financial accounting into a database that supports management, control and decision-making, so that the accounting computerisation continues to develop in depth. With the automation of data collection and accounting processing, financial personnel will spend less and less time on daily accounting processing, and more time will be spent on management, analysis and decision support. The system must provide assistance with the information needed by the financial staff. Amir Fazli et al. (2018) proposed to build a set of information user-oriented accounting information system based on business process reengineering theory and advanced information technology as the core. Xin Luo et al. (2018) proposed that the accounting information system based on the matter method should adopt the mode of integrating business processing and information processing to realise the real-time collection, processing and storage of information. If the accounting system can achieve real-time processing, it will greatly improve the timeliness of financial data. Mohsen Attaran and Jeremy Woods (2019) proposed to implement holographic collection of business data through an event-driven mechanism architecture and then use data warehouse technology to integrate data to implement data mining to provide financial data support for the company’s high-level strategic decision-making. Moreover, it designed a financial accounting information system implementation model based on data warehouse and data mining technology. Mehrbakhsh Nilashi et al. (2020) proposed to build an accounting information system based on the network accounting model. By analysing the difference between computerised accounting and informatisation, it is emphasised that the core of the computerised accounting system is to generate accounting vouchers and financial statements, whereas informatisation is based on the added value of accounting work.

Catherine Bachleda and Sanaa Ait Ouaaziz (2017) analysed the limitations of traditional accounting systems and proposed to build an accounting information system based on the REA model. It believes that the REA model gets rid of the defect of relying too much on the relevant elements and accounting views in the traditional loan accounting system during the development of the accounting information system in the past and realises the effective integration of business and
financial data. This lays the foundation for the follow-up research on how to realise the integration of business and finance in the ERP system. Mark Anthony Camilleri (2020) proposed to build an accounting information system based on the value chain theory. The value chain theory can be integrated with the accounting system. With the changes in the enterprise’s living environment, there has been a trend of integration between them. On the basis of examining the defects of the traditional accounting system, an accounting information system based on the value chain environment is constructed. Kristina Bogataj Habjan and Andreja Pucihar (2017) proposed to build an accounting information system based on cloud technology, which has the advantages of high cost performance, strong business scalability and simple operation. In addition to supporting the completion of normal accounting daily business, the system also opened up the transaction interface with the bank for capital, financing, credit and other services, and opened up the tax bureau interface to complete external financial activities such as tax declaration and input data certification business. Dawn laacobucci et al. (2021) proposed to build an accounting information system based on the Miche model and upgrade and transform the traditional accounting system from the five levels of information technology, software application, accounting data, IT culture and personnel quality.

Application analysis of clustering algorithm in accounting work

This article uses clustering algorithm as a big data mining algorithm when dealing with accounting information. Clustering analysis is abbreviated as clustering. It divides data objects into subsets according to a clustering algorithm, and each subset is called a cluster. The objects in the cluster are similar to each other, but the objects in different clusters are different from each other (laacobucci et al. 2019). Clustering algorithm is an unsupervised machine learning task, as it mainly discovers the natural grouping in data automatically, but this algorithm only evaluates input data and identifies natural groupings in feature space. The collection of things in the objects with same group is more comparable than other groups in cluster analysis. It is also characterised as a multi-objective optimisation problem. In addition, it can work independently to mine the value information hidden in the data, and it can also be used as a preprocessing step for other algorithms such as personalised recommendations.

The application of cluster analysis is very extensive, including biomedicine, network information retrieval, image pattern processing, business intelligence, flood forecasting, financial services and so on, in which information retrieval is nothing but the process of determining unstructured data from large collection of datas and the image pattern recognition refers to the problem of determining how to recognise visual patterns. An image pattern recognition system consists of a camera that acquires the image samples to be classified, an image pre-processor that improves the qualities of the images, a feature extraction mechanism that extracts discriminative features from images for recognition and a classification scheme that classifies the image samples based on the extracted features. The clustering process mainly includes four steps: sample preparation and feature extraction, similarity calculation, clustering and clustering result evaluation. Clustering analysis is used in several kinds of applications such as pattern identification, image processing, market research and data analysis. It also assist the marketers to determine unique groupings within their client base.

The process of extracting features is to minimise the amount of resources to explain the huge set of data. In general, it is the method of combining all the variables to get around these problems, but still data with sufficient accuracy is described. Furthermore, all the feature data set are combined to form single data for similarity calculation, and then the process of determining similarity between two features is called similarity calculation.

(1) Sample preparation and feature extraction: select effective features according to the characteristics of the sample and vectorise the feature group
(2) Similarity calculation: select the appropriate distance measurement function to calculate the similarity
(3) Clustering: clustering according to the clustering algorithm
(4) Clustering result evaluation: evaluate the clustering quality and interpret the results.

For objects to be clustered, people can easily classify them by observing their characteristics. In order for the computer to ‘recognise’ the clustering objects and classify them, it is necessary to describe the objects in a way that the computer can understand, that is, to describe the clustering objects with a clear mathematical measurement method. This process can be called feature vectorisation. Vectorisation is the process of improving an algorithm, to use SIMD instructions in CPUs.

Feature vectorisation is to quantify and disassemble complex clustering objects and transform them into a multi-dimensional vector composed of a series of
feature values for the computer to perform cluster analysis.

Of course, the above feature vectorisation method is too simple and straightforward, and it is problematic in practical clustering applications. This is because the dimensions of the two selected characteristics are different, which results in a color attribute with a large order of magnitude having a great influence on the clustering result, and the influence of the attribute of a weight with a smaller order of magnitude is weakened or even ignored. To solve the problem caused by non-uniform dimension, it is necessary to implement dimensionless operation (also known as data normalisation operation) on the initial data before clustering, so that each attribute value is within a unified numerical range. The process of structuring data in a database is known as normalisation. This comprises the creation of tables and the establishment of linkages between those tables in accordance with rules aimed to preserve the data while making the database more adaptable by avoiding redundancy and inconsistent reliance.

We assume that the data set has n data objects \( X = \{x_1, x_2, \cdots, x_n\} \), and each object has m attribute characteristics, namely (Xiang 2019):

\[
X_i = \{x_{i1}, x_{i2}, \cdots, x_{in}\}(i = 1, 2, \cdots, n) \quad (1)
\]

A Data Matrix, often known as a matrix, is a two-dimensional code made up of black and white ‘cells’ or dots organised in a square or rectangle arrangement. The data to be encoded can be either text or numeric. The typical data size ranges from a few bytes to 1556 bytes. The encoded data’s length is determined by the number of cells in the matrix. Then the data matrix corresponding to the data set is as follows:

\[
X' = \begin{pmatrix}
X'_{11} & \cdots & X'_{1m} \\
\vdots & \ddots & \vdots \\
X'_{n1} & \cdots & X'_{nm}
\end{pmatrix} \quad (2)
\]

There are six commonly used data normalisation operations as follows:

1. **Standard deviation normalisation**

\[
X'_{ij} = \frac{X_{ij} - \frac{1}{n} \sum_{i=1}^{n}X_{ij}}{\sqrt{\frac{1}{n-1} \left( \sum X_{ij} - \frac{1}{n} \sum_{i=1}^{n}X_{ij} \right)^2}} \quad (3)
\]

2. **Maximum normalisation**

\[
X'_{ij} = \frac{X_{ij}}{X_{j \text{max}}} \quad (4)
\]

3. **Range normalisation**

\[
X'_{ij} = \frac{X_{ij} - X_{j \text{min}}}{X_{j \text{max}} - X_{j \text{min}}} \quad (5)
\]

4. **Mean normalisation**

\[
X'_{ij} = X_{ij} \sqrt{\frac{1}{n} \sum_{i=1}^{n}X_{ij}} \quad (6)
\]

5. **Center normalisation**

\[
X'_{ij} = X_{ij} - \frac{1}{n} \sum_{i=1}^{n}X_{ij} \quad (7)
\]

6. **Logarithmic normalisation**

\[
X'_{ij} = \log X_{ij} \quad (8)
\]

Feature quantisation processes in addition to data normalisation, for some special cluster objects should also be targeted according to their characteristics. Quantisation is the process of converting input to output value, which means larger set of values is converted into smaller values with a finite number of members. Major example of this procedure are truncation and rounding. For example, the vectorisation of text documents requires the following steps: text document symbolisation, word count statistics, symbolised documentation converted to vector by term frequency inverse document frequency. The term inverse document frequency is the metric of finding whether the corpus of documents is common or uncommon. And the inverse document frequency is evaluated by dividing total number of corpus into documents with phrase. The operation of eigenvectorisation is very important. Because the clustering algorithm calculates the similarity based on the vector, only when the eigenvector accurately and completely describes the clustering object, can the reasonable and high-quality clustering result be obtained based on the vector (Huang and Rust 2021).

When the clustering algorithm is applied, there are many kinds of distance measures that can be used flexibly. Different distance measures have corresponding effects on the speed of the algorithm and the clustering results. Therefore, to obtain efficient and accurate clusters, the appropriate distance measurement should be selected according to the actual needs. Next, we use the vector \((a_1, a_2, \cdots, a_n)\) and \((b_1, b_2, \cdots, b_n)\) as an example to introduce several common distance definitions:

- Euclidean distance: It is the most simple and intuitive distance measure and is suitable for two or three-dimensional distance measurements. The length of a segment...
connecting two locations in either the plane or 3-dimensional space is measured by the Euclidean distance between them. It is the most straightforward method of expressing the distance between two places. It is expressed as:

\[ d = \sqrt{\sum_{i=1}^{n} (a_i - b_i)^2} \]  \hspace{1cm} (9)

Minkowski distance is an extension of the Euclidean distance, and it can be understood as a European distance of N-dimensional space. It is the process of measuring similarity between two points in the N-dimensional real space. Meantime, it is the generalisation of both Manhattan and Euclidean distance. It is expressed as:

\[ d = \sqrt[p]{\sum_{i=1}^{n} |a_i - b_i|^p} \]  \hspace{1cm} (10)

Manhattan Distance: Manhattan is also called blocks, and the distance between the two points is the absolute value of their coordinates. The sum of absolute differences between two vectors is calculated by using Manhattan distance, in which sum absolute error and the mean absolute error metric of L1 vector norm is
Expressed as (Huang and Rust 2021):

\[ d = |a_1 - b_1| + |a_2 - b_2| + \cdots + |a_n - b_n| \]  

Cosine Distance: The relation between two vectors in the inner product space is determined by calculating the cosine of the angle between two vectors. It is also used to measure the similarity between text analysis. The cosine distance is used to represent differences in the two vector directions. It is expressed as (Huang and Rust 2021):

\[ d = \frac{a_1b_1 + a_2b_2 + \cdots + a_nb_n}{\sqrt{a_1^2 + a_2^2 + \cdots + a_n^2} \sqrt{b_1^2 + b_2^2 + \cdots + b_n^2}} \]  

Corresponding to the complexity of the cluster object, the clustering method also has diversity.

It is not a simple matter to propose a concise and clear classification for a large number of clustering algorithms because these algorithms may overlap in characteristics, which makes a clustering algorithm have several types of characteristics. Jiawei Han45 and others divide clustering algorithms into the following categories.

Partitioning method: Given a set of n objects, the partitioning method divides the set into k groups \((k \leq n)\). The typical division method is to adopt mutually exclusive cluster division based on distance, that is, after constructing an initial division, use iterative positioning technology to move objects from one cluster to another to improve the division, so that the objects in the same cluster are as far as possible. The ground is related, and the objects of different clusters are as different as possible. K-means is a typical partition-based clustering algorithm. Based on similarity and the characteristics of the data, the clustering partition method sorts the information into several groups. It is the process of data analysis, in which the number clusters generated for the clustering method is specified for partition (Vangala et al. 2020).

Hierarchical method (hierarchical method): hierarchical decomposition of the data object set. The hierarchy of clusters is determined by the hierarchical clustering algorithm, in which the data points are assigned to the cluster automatically. Meanwhile, the two nearest clusters are combined to form single cluster, so in this algorithm only one cluster is left at the end of the process. According to the way of hierarchical decomposition, the hierarchical method can be divided into two types: cohesion method and split method. The agglomeration method starts to treat each object as a single cluster and then merges similar clusters from bottom to top until the termination condition is met; the split method starts to place all objects in a cluster and then iterates from the top to the bottom, each iteration; just divide a cluster into smaller clusters until the termination condition is met.

Density-based method: Density-based clustering is the kind of unsupervised learning algorithms, in which the cluster of distinct data is located, by means of continuous region of high density in a cluster data space then the high density data is separated from each other by clusters by contiguous regions of low point density. Most of the partitioning methods are clustering based on distance, so only spherical clusters can be found, which is not applicable to data sets of non-spherical clusters. The density-based method can be used for clustering of non-spherical data sets. The main idea is that as long as the density in the ‘neighborhood’ of a cluster reaches a set threshold, it is divided into the cluster. In other words, each data point in the cluster contains at least a certain number of data points in the neighborhood of a given radius. Density-based methods can filter noise or outliers and find clusters of arbitrary shape.

Grid-based method: The grid-based method divides the object space into finite units to form a grid structure and then performs clustering operations on the grid structure. It varies from traditional clustering algorithms in that it is concerned with the value space that surrounds the data points rather than the
data points themselves (Gupta et al. 2020). The processing speed of this method is very fast because its execution time is usually independent of the number of data objects but only determined by the number of units in each dimension in the quantisation space (Kannan 2017).

The feature vectorisation, distance measurement and algorithm selection in the clustering process will all affect the clustering results, so the quality of the clustering needs to be evaluated after the clustering. Benchmarks are ideal clusters constructed by experts.

Generally speaking, based on whether benchmarks are available, clustering quality assessment methods can be divided into two categories: external methods and internal methods. The extrinsic method is to evaluate the clustering quality by comparing the clustering results with the benchmark when there is a benchmark available; Intrinsic or absolute valuation is a way of determining the worth of a company based on the present value of its future cash flows. It is based on the valuer's estimates of how the firm would evolve, including the pace of growth, profitability, and

Figure 3. Flow chart of general ledger business.
investment levels. Unlike market-based valuation approaches, it does not base its valuation on the market price of comparable firms operating in a similar industry. Intrinsic valuation may be used to determine the worth of both public and private firms; the intrinsic method is to evaluate the clustering quality through the separation between clusters and the compactness of the cluster when no benchmark is available. Clustering quality. Extrinsic evaluation needs the ground truth table for measurement, but the intrinsic evaluation does not need any ground truth table for measurement. Some of the common clustering performance measures used in the extrinsic and intrinsic evaluation is Davies–Bouldin Index, Silhouette Coefficient and Calinski–Harabasz Index.

Silhouette Coefficient is a common measurement of the intrinsic evaluation method. Each point of silhouette technique is evaluated by silhouette technique, in which quantify how similar a point is to its own cluster when compared with other clusters by displaying a brief graphical depiction of how effectively each object was categorised. For data sets D containing N objects, we assume that D is divided into K clusters C₁, C₂, ⋯, Cₖ. For each data object o ∈ D, the average distance a(o) is calculated between o and other objects within the cluster. The minimum average distance between o and objects that do not belong to the cluster o is b(o).

\[
a(o) = \frac{\sum_{o' \in C, o \neq o'} \text{dist}(o, o')}{|C_i| - 1} \tag{13}
\]

and

\[
b(o) = \min \left\{ \frac{\sum_{o' \in C, o \neq o'} \text{dist}(o, o')}{|C_j|} \right\} (C_j: 1 \leq j \leq k, j \neq i) \tag{14}
\]
According to $b(o)$ and $a(o)$, the contour coefficient of the object $o$ can be defined as:

$$s(o) = \frac{b(o) - a(o)}{\max |a(o), b(o)|}$$  \hspace{0.5cm} (15)$$

The value of the contour coefficients obtained by the above formula is between and 1. The contour coefficient $a_0$ is determined using the average distances between the center and the records in the same clusters, whereas the contour coefficient $b_0$ is derived using the distances between the records and the centers of separate clusters. The value of $a(o)$ reflects the tightness of $o$ with the cluster to which it belongs. The smaller the value, the closer it is to the cluster it belongs to. The value of $b(o)$ reflects the degree of separation between $o$ and other clusters. The larger the value, the more separation between $o$ and other clusters. Therefore, the closer the contour coefficient value of $o$ is to 1, the closer $o$ is to the cluster and the farther away it is from other clusters. This is an ideal clustering result. Conversely, a negative contour coefficient means that $o$ is closer to objects in other clusters than objects in the same cluster, which is obviously an unreasonable clustering result (Ali et al. 2018).

From the aforementioned analysis, it can be seen that the average of the contour coefficients of all objects in the cluster can reflect the clustering of the cluster. Therefore, the average of the contour coefficients of the data objects

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**Figure 5.** Internal architecture diagram.
in the entire data set can be used to evaluate the quality of the clustering.

**Accounting work quality improvement model of new agricultural business entity**

We develop a standardised new agricultural business entity bank account management process, divide bank account management into three stages of accounting, logout and change. Among them, each stage must strictly control relevant laws and regulations and internal management systems, improve information archiving and filing processes and ensure the legal compliance of the system, and the informations remain accurate (Maddikunta et al. 2021). Furthermore, we establish a funding system for the financial shared service system of new agricultural business entity, combed the headquarters and bank accounts of each branch and cancel the unnecessary bank account. At the same time, we will unify the bank accounts of each branch through the financial sharing service system, depart from the original branch and reduce the management risk of the bank account. The reengineering of the management process for new agricultural business entity bank accounts is shown in Figure 1 (Singh et al. 2020).

The new agricultural business entity reengineered the inherent expense reimbursement process when constructing the financial sharing service system. In addition, building an expense control module and an image module in the system can greatly optimise the expense reimbursement process and strengthen the budget control of the new agricultural business entity. Each branch is still responsible for managing the stub notes and other file materials of the expense reimbursement business, while the headquarters is solely responsible for the data review, reimbursement approval, amount accounting, fund settlement and payment of the expense reimbursement business, so as to electronicise the paper information and realise the seamless connection and synchronisation of information flow and physical logistics in the new agricultural business entity expense reimbursement process. Furthermore, each branch only needs to set up a fixed person to be responsible for the visualisation of the bill, submit a reimbursement application and enter the relevant information into the system (Khattar et al. 2019). This avoids the risk of damage and loss of paper notes due to multiple passes, reduces the workload of financial personnel, reduces the processing cycle and improves the efficiency of financial work. The expense reimbursement process after process reengineering is shown in Figure 2.

By linking the general ledger module with multiple modules such as fund management and salary payable, the financial data information of the new agricultural business entity can be processed, summarised and analysed quickly and efficiently in the financial shared service system. This avoids the complicated process of merging, reporting and re-merging step by step in the traditional model, solves the disadvantages of low data information transmission efficiency and long transmission cycle and realises financial sharing. Transmission efficiency is defined as the overall quantity of information bits, which means the bits in the message sent by the user divided by the total number of bits in transmission (Hsu et al. 2020). The general ledger process of the financial shared service system of the new agricultural business entity is a summary of each process, as shown in Figure 3.

The General Ledger (GL) Module is a general ledger system that supports a wide range of businesses and currencies. Accounts receivable, payments and inventory are integrated with the GL Module. It is used to establish a chart of accounts and track transactions that occur inside those accounts. The external structure of the cost allocation system mainly revolves around the bank’s overall management accounting system construction goals, including three parts: data foundation, management accounting platform/multi-dimensional accounting and analysis, shareholder value return and strategic operation analysis, as shown in Figure 4.
The value supplied to a company’s equity owners as a result of management’s ability to improve sales, profitability and free cash flow, resulting in increased dividends and capital gains for the shareholders, is referred to as shareholder value, and the strategic analysis is the process of analysing an organisation’s business environment with its works. It is also used to develop the strategic plans for decision-making and to maintain smooth operation of an organisation. The internal structure of the cost allocation system is the system, which is used to determine whether the entity inside an organisation delivers a product or service, which entity consumes the product or service and how the cost is transferred from the provider to the consumer or consumers and it is based on the application of management accounting, including four parts: unified management accounting application platform, management accounting data mart, cost allocation and analysis report platform, as shown in Figure 5.

This article builds a set of highly intelligent accounting system. The operating process of the accounting model engine is shown in Figure 6.

The strategic decision-making platform hopes to display the output results of the financial analysis system to the company’s management in a more intuitive, diversified and real-time manner through human–computer interaction through a visual interface. A strategic decision-making process helps the users to analyse their needs, their works and how it can be accomplished. It having step-by-step plan to achieve objective.

Figure 7. Design principle of the strategic decision-making platform.
The system needs to support the pre-set personalised display of different information dimensions and business types according to the responsibilities of different decision makers, so as to provide decision makers with the most valuable information in a timely manner. When the decision-maker finds that there is a deviation in the operation, the system adjusts and corrects the strategic objectives by adjusting the overall budget, performance appraisal, liquidity and other indicators, so as to solve the problems in the operation at any time. The design principle of the platform is shown in Figure 7.

Effectiveness verification of the accounting work quality improvement model of the new agricultural business entity based on big data

This article combines big data technology to construct an accounting work quality improvement model of the new agricultural business entity based on big data and then performs performance verification of the system. From the actual situation, the accounting work system of this paper is mainly based on big data technology. The purpose of big data in organisations and corporations is detecting patterns and trends in human behaviour and
interaction with technology. The major sources of big data technology is image, text, video and audio. Big data technology is widely used in the modern agriculture, hence it delivers the data about fertiliser requirements, water cycles in graphical format. In addition, it helps the farmers to take smart decisions, such as which crop will give yields and when to harvest the crops etc… Therefore, when verifying the effectiveness of the accounting work system of the new agricultural business entity, it is necessary to evaluate the big data technology and the quality of the accounting work. First, this article conducts an evaluation of big data technology. After collecting a large number of accounting work data of agricultural business entities through the Internet, this article processes these data through the system of this paper to score the effect of big data processing technology. The results are shown in Table 1 and Figure 8.

From the aforementioned research, we can see that the accounting work quality improvement model of the new agricultural business entity based on big data technology constructed in this article has excellent data mining capabilities for accounting data. On this basis, the quality of accounting work is evaluated, and the results are shown in Table 2 and Figure 9.

From the aforementioned research results, it can be seen that the accounting work quality improvement model of the new agricultural business entity based on big data technology constructed in this article can effectively improve the accounting work quality of the new agricultural business entity.

**Conclusion**

With the improvement of my country's economic development level, the development of agricultural production organisations has gradually shifted from simple and extensive to high-quality, and the development of new agricultural business entities directly affects my country's future food security, so its operating results have attracted the attention of the government and the public. The accounting of the new agricultural business entity's operating performance and the choice of future strategic planning are all directly affected by the quality of its accounting work. Therefore, it is very important to strengthen the accounting supervision of the new agricultural business entity. Moreover, the establishment of a sound internal and external accounting supervision system can effectively improve the accounting work quality of the new agricultural business entity and realise the healthy development of the new agricultural business entity. Based on big data technology, this article combines data mining algorithms to construct an accounting intelligence system that can be applied to the new agricultural business entity, and this article proves the reliability of this system through experimental research.

**Disclosure statement**

No potential conflict of interest was reported by the author(s).

**Notes on contributor**

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**References**

Ali Z, Gongbing B, Mehreen A. 2018. Understanding and predicting academic performance through cloud computing adoption: a perspective of technology acceptance model. J Comput Educ. 5(3):297–327.

Attaran M, Woods J. 2019. Cloud computing technology: improving small business performance using the Internet. J Small Bus Entrep. 31(6):495–519.

Bachleda C, Ouaziz SA. 2017. Consumer acceptance of cloud computing. Serv Mark Q. 38(1):31–45.

Camilleri MA. 2020. The use of data-driven technologies for customer-centric marketing. Int J Big Data Manag. 1(1):50–63.

Chibuye M, Phiri J. 2017. A remote sensor network using android things and cloud computing for the food reserve agency in Zambia, IJACSA. Int J Adv Comput Sci Appl. 8(11):411–418.

Ducange P, Pecori R, Mezzina P. 2018. A glimpse on big data analytics in the framework of marketing strategies. Soft comput. 22(1):325–342.

Fazli A, Sayedi A, Shulman JD. 2018. The effects of autoscaling in cloud computing. Manage Sci. 64(11):5149–5163.

Girchenko T, Kossmann R. 2017. Implementation and development of digital marketing in modern banking business. Eur Coop. 12(19):68–85.

Gupta N, Khosrawy M, Patel N, Dey N, Gupta S, Darbari H, Crespo RG. 2020. Economic data analytic AI technique on IoT edge devices for health monitoring of agriculture machines. Appl Intell. 50(11):3990–4016. 21.

Habjan KB, Pucihar A. 2017. Cloud computing adoption business model factors: does enterprise size matter? Eng Econ. 28(3):253–261.

Hsu TC, Yang H, Chung YC, Hsu CH. 2020. A creative IoT agriculture platform for cloud Fog computing. Sustain Comput: Inform Syst. 28:100285.

Huang MH, Rust RT. 2021. A strategic framework for artificial intelligence in marketing. J Acad Mark Sci. 49(1):30–50.
Iacobucci D, Petrescu M, Krishen A, Bendixen M. 2019. The state of marketing analytics in research and practice. J Mark Anal. 7(3):152–181.
Kannan P K. 2017. Digital marketing: a framework, review and research agenda. Int J Res Market. 34(1):22–45.
Khattar N, Sidhu J, Singh J. 2019. Toward energy-efficient cloud computing: a survey of dynamic power management and heuristics-based optimization techniques. J Supercomput. 75(8):4750–4810.
Luo X, Zhang W, Li H, Bose R, Chung QB. 2018. Cloud computing capability: its technological root and business impact. J Org Comput Electron Commer. 28(3):193–213.
Maddikunta, PKR, Hakak S, Alazab M, Bhattacharya S, Gadekallu TR, Khan WZ, Pham QV. 2021. Unmanned aerial vehicles in Smart agriculture: applications, requirements, and challenges. IEEE Sensors J. 1–1.
Manogaran G, Hsu C, Rawal BS, Muthu B, Mavromoustakis CX, Mastorakis G. 2021. ISOF: information scheduling and optimization framework for improving the performance of agriculture systems aided by industry 4.0. IEEE Internet Things J. 8 (5):3120–3129.
Nilashi M, Samad S, Ahmadi N, Ahani A, Abumallloh RA, Asadi S, Abdullah R, Ibrahim O, Yadegaridehkordi E. 2020. Neuromarketing: a review of research and implications for marketing. J Soft Comput Decis Support Syst. 7(2):23–31.
Olson C, Levy J. 2018. Transforming marketing with artificial intelligence. Appl Mark Anal. 3(4):291–297.
Palos-Sanchez PR, Saura JR, Reyes-Menendez A, Vásquez Esquivel I. 2018. Users acceptance of location-based marketing apps in tourism sector: an exploratory analysis. J Spat Organ Dyn. 6 (3):258–270.
Singh P, Dwivedi YK, Kahlon KS, Sawhney RS, Alalwan AA, Rana NP. 2020. Smart monitoring and controlling of government policies using social media and cloud computing. Inf Syst Front. 22(2):315–337.
Steinhoff L, Arli D, Weaven S, Kozlenkova IV. 2019. Online relationship marketing. J Acad Mark Sci. 47(3):369–393.
Vangala A, Das AK, Kumar N, Alazab M. 2020. Smart secure sensing for IoT-based agriculture: blockchain perspective. IEEE Sensors J. 1–1.
Wright LT, Robin R, Stone M, Aravopoulou DE. 2019. Adoption of big data technology for innovation in B2B marketing. J Bus-to-Bus Mark. 26(3–4):281–293.
Xiang Y. 2019. Set self-service sales and online customization in one of the product network marketing system construction and management research. Cluster Comput. 22 (4):8803–8809.
Yin C, Ding S, Wang J. 2019. Mobile marketing recommendation method based on user location feedback. Hum-Centric Comput Inf Sci. 9(1):1–17.