Distributed Cloud Multimedia Storage Technology in the Construction of Economic Intelligent

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Abstract: - In the context of economic intelligence construction, enterprises are facing the dual challenges of fierce market competition and efficient management. To address these challenges, it is particularly important to build an economic intelligent decision-making platform. With the diversification of information forms and the explosive growth of data volume, the management and storage of multimedia data have become an urgent problem to be solved. This article delves into the application of distributed cloud multimedia storage technology in this field and builds an economically intelligent decision-making platform based on this technology. By combining relevant operational and management data, the platform can provide powerful data support for decision-making, realizing functions such as data query, operation, knowledge discovery, and result generation. The research results show that with the increase in storage memory, the storage rate and energy consumption of cloud multimedia systems show a downward trend, while the average queue length gradually increases. In addition, we also found that the transmission rate and energy consumption first decrease and then stabilize during the process of increasing memory, while the average queue length continues to increase. These results provide important references for optimizing distributed cloud multimedia storage technology.

Key-Words: - distributed, cloud multimedia, storage, economic decision-making, intelligent platform, optimization.

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1 Introduction

With the increasing degree of economic openness, international cooperation has become closer, trade exchanges have become more frequent, and the corresponding market competition has become increasingly fierce. In the face of the current complex and changeable international environment and market environment, enterprises need not only actively respond to the market impact of foreign investment, but also strengthen their strength, actively seek overseas investment, and improve their international competitiveness, [1]. Investment is the key to stable economic growth. Improving the consumption environment through investment, thus increasing the consumption expenditure of residents, can promote the steady development of the economy, [2]. However, the investment projects of many enterprises are often large in amount and have a wide social impact. Therefore, we should pay more attention to and strengthen the preliminary work of the project, strengthen the investment management of enterprises with a scientific and complete decision-making system as the support, and form an efficient investment decision, [3].

With the continuous deepening of information construction, the information system has accumulated a large amount of business data, including a large number of text, images, voice, and other business information, which makes the database of the enterprise grow exponentially, [4]. Although these data are of great value to the daily management and development planning of enterprises, they cannot be fully and effectively utilized and are only limited to the basic functions such as simple query, deletion, and statistics. The method to find the basic rules of enterprise operation from a large number of data and predict future development trends is still lacking, resulting in a huge waste of information resources, [5]. Therefore, how to effectively improve the utilization of data resources and provide an accurate, comprehensive, and timely decision-making basis for the development of enterprise economic level, system management, and business planning has become an urgent issue for many enterprises, [6].

On the one hand, with the changes in the international environment and market environment, the external environment has become more complex and the market competition has been increasingly enhanced, [7]. In the face of massive enterprise operations and financial data, higher requirements are put forward for group decision-making of enterprise investment projects, [8]. In the big data environment, it is reflected in the complexity of enterprise operation data and financial data, as well as the complexity of decision-making groups, which makes enterprise decision-making different from the traditional mode, [9]. The analysis of enterprise intelligent investment decision-making needs to be further improved.

The volume and complexity of big data far exceed traditional data processing capabilities, requiring enterprises to adopt more advanced data storage, processing, and analysis technologies, such as distributed computing, cloud computing, artificial intelligence, etc., to achieve rapid processing and deep mining of massive data. This is not only a test of technical capabilities, but also an urgent need for upgrading and replacing enterprise IT infrastructure. In the big data environment, information is both rich and complex, and valuable information is often overwhelmed by a large amount of irrelevant data, [10]. How to efficiently filter out key information that has a substantial impact on enterprise decision-making from massive data has become a major challenge. This requires enterprises to have strong data analysis capabilities and be able to use advanced technologies such as machine learning and data mining to deeply mine and extract value from data. With the diversification and fragmentation of information sources, obtaining comprehensive and accurate market information has become increasingly difficult. Enterprises need to establish a multi-channel information collection system and strengthen their data cleaning and integration capabilities to ensure the authenticity and effectiveness of information. In addition, cross-domain and cross-industry data sharing and cooperation have become important ways to improve information acquisition efficiency, [11]. Therefore, under the premise of taking economic benefits as the center, it is urgent to establish a decision support system suitable for the development characteristics of enterprises and optimize the economic decision-making platform, [12]. Provide good auxiliary decision-making services for the economic activities of enterprises and realize intelligent decision-making.

In order to optimize the economic decision-making platform, more and more enterprises use multimedia data for data analysis in the decision-making process. In the contemporary information society, multimedia has played an important role in many industries, [13]. However, after the introduction of multimedia information into the computer, the traditional storage technology cannot meet the resource management requirements due to its dispersion, heterogeneity, and mass. The multimedia storage system needs to support both continuous media. Continuous media access requires a large amount of disk bandwidth and lasts for a long time, [14]. A large amount of disk bandwidth is reserved for continuous media access for a long time, which seriously affects the performance of accessing other file types. How to reduce the space occupation of continuous media has become a key issue in the development of multimedia storage technology, [15].

With the increase in network bandwidth and the popularity of mobile Internet, the concept of cloud storage began to rise. Multimedia storage technology under cloud storage has also been gradually developed, [16]. Multimedia technology based on cloud storage refers to the use of more efficient network technology to integrate a series of multimedia resources, [17]. All departments are organized into a structural circle, and the management layer, service layer, and other platforms in the enterprise are managed in a unified manner, and the multimedia resources therein are reasonably distributed, deployed, and planned in a unified manner, so that the storage of all resources in the structural circle is within a reasonable range, so as to ensure the effective storage of multimedia resources, [18].

To sum up, this paper optimizes the existing decision-making platform against the background of enterprise economic decision-making. Taking the multi-objective programming model and data envelopment analysis model as the core of economic decision-making analysis, the intelligent decision-making platform is realized. Combined with distributed multimedia storage technology and cloud storage technology, the application of distributed cloud multimedia storage technology is realized, and the economic intelligent decision-making platform based on enterprise multimedia data is designed and developed. Based on an example, the system has proved to be practical and effective.

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2 Distributed Cloud Multimedia Storage Technology

2.1 Distributed Technology

Distributed system refers to one or more independent computer collection systems. They communicate with each other through the communication protocol between the nodes and provide services to the outside at the same time. However, users can not feel that there are so many computer nodes, [19]. This means that for relatively expensive large machines, more ordinary computers can be used to form distributed clusters. The more computers there are, the more memory, CPU, and storage resources there are, and the more concurrent accesses can be handled. The communication and coordination among the hosts in the distributed system are mainly carried out through the network, and there are no restrictions in space. Large companies can even deploy many service hosts across borders. The infrastructure of distributed file system is shown in Figure 1.

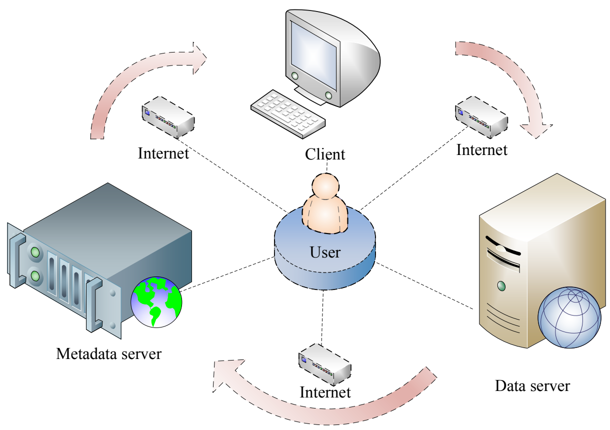

Fig. 1: The infrastructure of distributed file system

2.2 Multimedia Storage Optimization

Traditional multimedia storage is based on a single node, so the memory is limited. Compared with the centralized storage system, the scalability of the distributed storage system makes the cost of sharing data through the network much less than reading data from the disk. To maximize the performance of the multimedia storage system, the free memory resources of other nodes in the system can be fully utilized through the network. Therefore, it is necessary to establish a distributed multimedia database, [20]. The design of a distributed multimedia database resource integration system is a complex process. The design shall strictly follow the principles of standardization, integrity, continuity, compatibility, and low coupling under the overall idea of basic practicality, overall planning, and step-by-step implementation.

The overall framework of this paper is designed with reference to the B / S three-layer logic architecture mode [21], as shown in Figure 2.

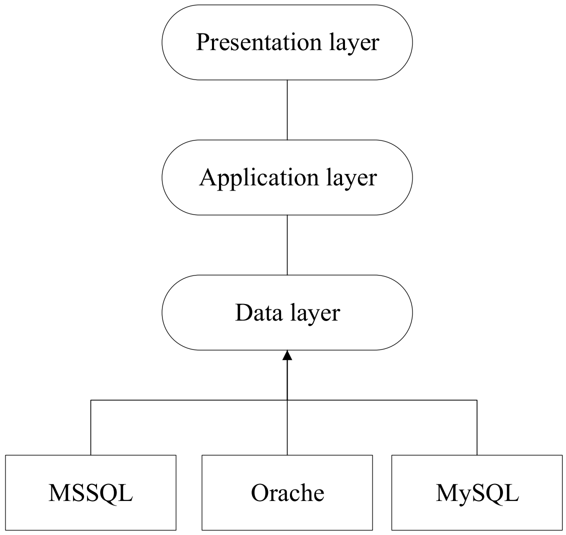

Fig. 2: The B / S three-layer logic architecture mode

The B/S (Browser/Server) three-layer logical architecture pattern shown in Figure 2 is a widely used architecture pattern in modern software development. Mainly responsible for receiving user input requests and displaying the processed results to the user. In web applications, the presentation layer is typically composed of HTML pages, CSS styles, and JavaScript scripts, which together build a user-friendly interface. In the B/S three-layer logical architecture mode, users access the system through a browser, which sends their requests to the server-side presentation layer. After receiving the request, the presentation layer passes it to the business logic layer for processing. The business logic layer verifies and processes requests based on business rules and then passes the processing results to the data access layer for data storage or retrieval. Finally, the data access layer returns the processed data to the business logic layer, which then encapsulates the data into a user-friendly format and returns it to the presentation layer, ultimately presenting it to the user. In this context, the introduction of Slepian Wolf distributed lossless coding (DSC) provides a new perspective for the processing of multimedia data, [22]. The Slepian Wolf theorem is an important milestone in information theory, which reveals the theoretically achievable compression efficiency limit when two or more related sources are independently encoded but jointly decoded. This theory lays the foundation for distributed source coding (DSC), enabling nearoptimal compression performance even without knowing the specific correlations.

$$R_X \geq H\left(X \middle| Y\right) \tag{1}$$

$$R_Y \geq H\left(Y \middle| X\right) \tag{2}$$

$$R_X + R_Y \geq H\left(X, Y\right) \tag{3}$$

In order to improve the utilization of memory, the sequential access of continuous media is used to improve the hit rate of the cache and reduce the access to disk. The replacement algorithm in the stored procedure is selected as the GLNU Cooperative Cache Strategy, [23].

2.3 Architecture of Distributed Storage Engine

The distributed storage engine should be composed of three parts: the user layer, the service layer, and the bottom driver. The user layer mainly provides the user interface available to data mining users. The service layer is the core part of the whole system. The main functional modules to be realized include HBase / hive integration module, the data mining module based on the improved k-means algorithm, the HBase data parallel loading module, etc. The bottom driver is mainly provided by the Hadoop distributed file system. On the physical structure, the distributed node deployment is shown in Figure 3.

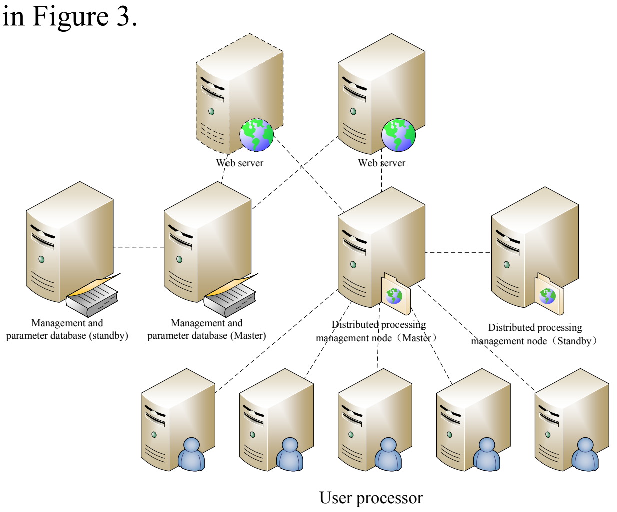

Fig. 3: The physical structure of the distributed node deployment

2.4 Cloud Multimedia Technology

With the increasing amount of multimedia data, the amount of information it contains is also growing. Data security and privacy protection have become important challenges faced by cloud storage systems. To solve this problem, various measures such as encryption technology, access control mechanisms, and data isolation policies need to be adopted to ensure the security and privacy of data, [24]. For multimedia applications that require high real-time performance, such as online video and live streaming, bandwidth and latency are key factors affecting user experience. Cloud storage systems need to optimize data transmission protocols and deploy CDN (Content Delivery Network) technologies to reduce data transmission latency and bandwidth usage. The construction and operation costs of cloud storage systems are relatively high, and how to reduce costs while ensuring service quality is a common concern for both enterprises and users. By optimizing resource allocation, adopting energy-saving technologies, and improving equipment utilization, a balance between cost and benefit can be achieved, [25].

Multi-cloud media uses a large number of servers to support video streaming services, and its total power consumption can be obtained by calculating the total power consumption of servers and auxiliary facilities. Auxiliary facilities include refrigeration, lighting, and other facilities, [26]. The digital telecommunications complex, as a comprehensive system that integrates communication, information technology, and media processing, provides a new approach to solving this challenge. It achieves efficient transmission, storage, and processing of media data by deeply integrating communication technology with information technology. In this digital telecommunications complex, media data is no longer just a carrier of information but has become an important force driving social progress and economic development, [27]. Cloud computing provides powerful data storage and computing capabilities, making the storage and management of massive media data more convenient and efficient. Big data technology reveals hidden information and patterns behind media data through deep mining and analysis, providing powerful support for enterprise decision-making, [28]. Artificial intelligence technology, on the other hand, achieves automated classification, labeling, and recommendation of media data through intelligent processing and analysis methods, further enhancing the intelligence level of digital telecommunications complexes. In this context, the development of digital telecommunications complexes for storing and analyzing media data has broad prospects and profound significance, [29]. On the one hand, it can help enterprises better manage and utilize media data resources, and enhance their competitiveness and innovation capabilities. On the other hand, it can also provide more convenient and efficient ways for governments and various sectors of society to obtain and interact with information, promoting the process of informatization and intelligence in society.

The cloud multimedia system has a large number of servers. Each server in the server cluster should have the ability to handle video streaming tasks, but the demand for video streaming tasks within different time slots may fluctuate greatly. Therefore, achieving effective load balancing is crucial. The system should be able to monitor the load situation of each server in real-time and dynamically adjust the task allocation to each server to ensure that all servers are kept within the efficient operating range as much as possible, avoiding some servers being overloaded while others are idle. Cloud multimedia systems should have elastic scalability, which means automatically increasing or decreasing the number of servers based on real-time needs. During peak demand, servers can be quickly increased to cope with high loads; During low demand periods, servers can be reduced to lower power consumption and costs.

$$P(t)=n(t)\begin{bmatrix} P_{idle}+\left(E_{usage}-1\right)P_{busy} \\ +\left(P_{busy}-P_{idle}\right)U(t) \end{bmatrix} \quad (4)$$

Assuming the arrival rate of each user request is $R_i(t)$, the average service request rate received by the multimedia cloud system in time slot t is:

$$R(t)=\lim_{t\to\infty}\frac{1}{t}\sum_{\tau=0}^{t-1}E\left[R_i(\tau)\right] \quad (5)$$

Then the power consumption of the cloud multimedia system in time slot t is:

$$R(t)=\lim_{t\to\infty}\frac{1}{t}\sum_{\tau=0}^{t-1}E\left[R_i(\tau)\right] \quad (6)$$

2.5 Experimental Analysis

To verify the effectiveness of distributed cloud multimedia storage technology, and analyze the impact of different memory. The optimized stable random algorithm is selected for storage and transmission experiments. The performance indexes considered in the experiment are:

1. Storage rate: a measure of video stream storage in cloud multimedia. The value is a positive real number, and a larger value indicates a higher rate.
2. Average queue length: a measure of average queue delay. The longer the average queue, the longer the queue delay.
3. Energy consumption: the total energy consumption of the multimedia cloud system when the video stream load is executed.

The storage memory m is a parameter adjusted by the multimedia cloud system according to the actual user request. Setting different memory values can give different system performance and efficiency values. Figure 4, Figure 5 and Figure 6 show the changes in the average queue length, storage rate, and average energy consumption of the cloud multimedia storage system when m = 1 g, M = 1.5 g, and M = 2 G respectively.

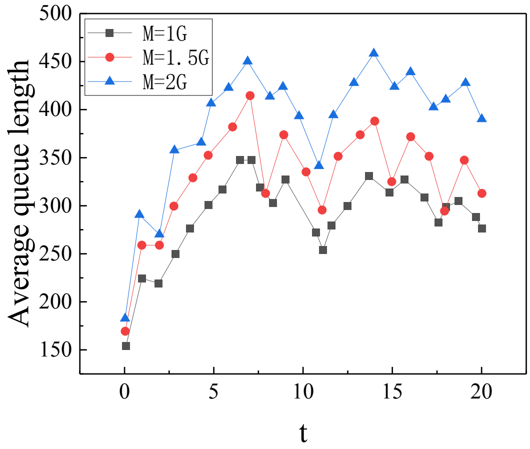

Fig. 4: The changes in the average queue length of the cloud multimedia storage system

As can be seen from Figure 4, the average queue length of cloud multimedia data storage shows an increasing trend. With the increasing memory, the average queue length increases. When M= 2 G, the average queue length of the cloud multimedia system is 15.3% higher than that when M = 1.5 g.

Figure 5 shows the change in the memory rate when the memory m changes. When the memory m increases, the storage rate decreases. When m = 2 G, the storage rate of the system is 5.44% lower than that when m = 1.5 g. At the same time, it can be seen from Figure 6 that when the memory increases, the average energy consumption of the multimedia cloud system decreases. The system energy consumption at M = 2 G is 33.2% lower than that at M = 1.5 g.

Through comprehensive analysis of Figure 4, Figure 5 and Figure 6, they can be seen that: (1) the storage rate and energy consumption decrease with the increase of the memory m, but the average queue length increases with the increase of the memory m, because the RPA-QEB algorithm is sensitive to the memory value, and a large memory will prolong the response time of multimedia data. At the same time, the number of calls, requests, and queue length will increase in the transmission process, so as to reduce energy consumption. (2) With the increase in memory, the transmission rate and energy consumption will first decrease and then tend to be flat, while the average queue length will continue to increase.

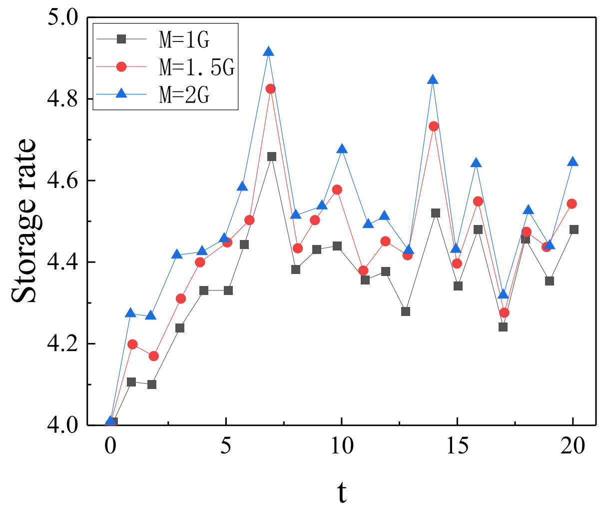

Fig. 5: The changes in the memory rate of the cloud multimedia storage system

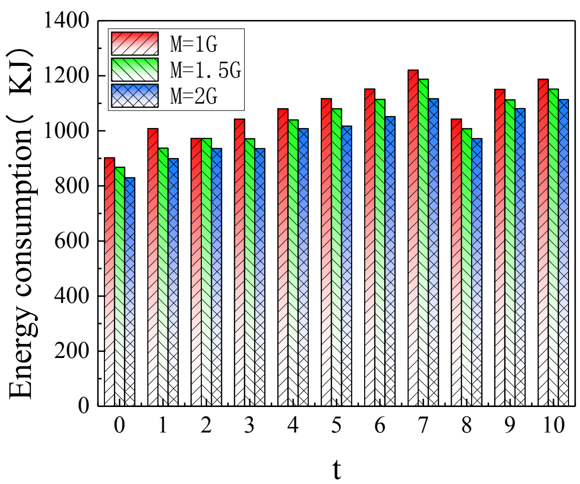

Fig. 6: The changes in the energy consumption of the cloud multimedia storage system

In the experimental setup, we adjusted the storage parameter m in the multimedia cloud system according to the actual user request situation and set three different memory capacity configurations: m=1G, m=1.5G, and m=2G. By comparing the system performance under different memory capacities, we can gain a more intuitive understanding of the impact of memory capacity on system performance. The storage rate and energy consumption decrease with the increase of memory capacity m, but the average queue length increases with the increase of m. This is mainly because the RPA-QEB algorithm is sensitive to memory capacity values. When the memory capacity is large, although it can cache more data, it will also prolong the response time of multimedia data and increase the number of waiting data in the queue. However, this increased amount of data may reduce energy consumption during transmission through optimization strategies such as merging requests, reducing transmission times, etc. As the memory capacity continues to increase, the transfer rate and energy consumption will first decrease and then stabilize, while the average queue length will continue to increase. This is mainly because when the memory capacity increases to a certain extent, the system's caching and management capabilities for data will reach saturation, and at this point, increasing the memory capacity will have a limited impact on improving system performance. Therefore, in practical applications, we need to choose a reasonable memory capacity configuration based on the specific requirements and resource limitations of the system to achieve optimal performance and energy efficiency.

3 Design of Economic Intelligent Decision-making Platform

3.1 Economic Evaluation Mode

3.1.1 Multi-Objective Optimization

Multi-objective optimization is to study the optimization of more than one objective function in a given region. It is based on linear programming and gradually developed. A series of decision-making schemes corresponding to the data can be obtained by analyzing the importance and expectation of the target and the changes in relevant data. It is assumed that there are L targets, K priorities, and n variables. The expected value of the kth target is g_k and the decision variable is x_j. In the multi-objective programming problem, the objective function is:

$$\min Z = \sum_{k=1}^{K} P_k \sum_{l=1}^{L} \left(w_{kl}^{-} d_l^{-} + w_{kl}^{+} d_l^{+} \right) \tag{7}$$

The target constraint is:

$$\sum_{j=1}^{n} c_j^{(l)} x_j + d_l^{-} - d_l^{+} = g_l \left(l = 1, 2, \cdots, L \right) \tag{8}$$

The absolute constraint is:

$$\sum_{j=1}^{n} a_{ij} x_j \le (=,\ge) b_i \left(i = 1, 2, \cdots, m\right) \tag{9}$$

Nonnegative constraints are:

$$\begin{cases} x_j \ge 0\left(j = 1, 2, \cdots, n\right) \\ d_l^+, d_l^- \ge 0\left(l = 1, 2, \cdots, L\right) \end{cases} \tag{10}$$

3.1.2 Selection of Evaluation Parameters

Economic evaluation involves multiple levels and factors. And all levels and factors are interrelated. According to the characteristics of each enterprise's economic evaluation, the content of multimedia data is fully considered, and the influencing factors are summarized into four aspects: policy factors, capital factors, enterprise's own factors, and human capital factors. As there are many types of enterprises and many parameters involved in economic evaluation, some parameters should be selected when establishing the multi-objective programming model to reflect the main factors of enterprise economic evaluation as comprehensively as possible and minimize the impact of neglected parameters on the evaluation results. The selection of parameters should also be objective, that is, it can be used for different target areas, and the meaning of indicators is unchanged, so as to facilitate the comparison and analysis of results.

(1) Selection of policy factor parameters. The policy factors are mainly related to the corresponding regulations and industry standardization suggestions issued in the past five years.

(2) Selection of fund factor parameters. Capital factor is the focus of enterprise economic evaluation. Financial evaluation, as a fundamental part of project assessment, focuses on evaluating the profitability and financial health of the project within the established financial framework (including national financial and tax systems, pricing systems, etc.). It mainly measures the economic effectiveness of projects through a series of quantitative indicators. It reflects the strength of the project's own profitability and is the minimum annual interest rate at which the internal cash flow of the project can meet investment requirements. The higher the IRR, the stronger the project's profitability. The net amount is obtained by discounting the future net cash flows of the project to the current point in time, after deducting the initial investment cost. NPV greater than zero indicates that the project is financially feasible, and the larger the NPV value, the higher the economic value of the project. The time required for a project to recover all initial investment costs from the start of investment. A shorter payback period is often seen as a sign of lower project risk and faster capital recovery. In the process of financial evaluation, in addition to the core indicators mentioned above, it is also necessary to consider the impact of uncertain factors such as price fluctuations, market demand changes, and tax policy adjustments on financial indicators. Evaluate the financial stability of the project through sensitivity analysis, risk assessment, and other methods.

(3) The choice of the enterprise's own factors. The enterprise's own business planning and development direction have a great impact on economic development. Factors mainly include business level, innovation, enterprise scale, efficiency, system, etc.

(4) Human capital factor. Mainly including: 1. The proportion of full-time technical development personnel in the total number of employees. 2. Number of experts (including doctors) in the technical department. 3. Number of domestic and foreign experts engaged in development work in the technical department in the current year (person-months). 4. The ratio of the number of overseas technical exchanges of technical department personnel to the number of departments. 5. Ratio of annual per capita income of technical departments to annual per capita income of enterprises. 6. The ratio of the maximum annual income of technical department personnel to the per capita annual income of the Department. 7. The proportion of domestic and foreign training expenses of technical department personnel in the total income of department personnel.

3.1.3 Evaluation Model

DEA is a nonparametric method for evaluating technical efficiency, particularly suitable for comparing efficiency between decision units (DMUs) with multiple input and output indicators whose units are inconsistent. The core idea of this method is to evaluate the efficiency level of each DMU relative to an envelope frontier (i.e., the optimal input-output combination boundary) by constructing it. In this process, there is no need to set the weights of each input and output indicator in advance. The weights are automatically determined based on optimization principles during the solving process. One of the most significant advantages of DEA is its ability to handle input-output data of different dimensions and units, which gives it great flexibility in evaluating the efficiency of complex systems. Traditional efficiency evaluation methods often require pre-set weights for indicators, which may lead to subjectivity in the evaluation results. DEA automatically determines weights by solving optimization problems, reducing human intervention.

Each DMU has a corresponding efficiency evaluation index:

$$h_j = \frac{u^T y_j}{v^T x_j} = \frac{\sum_{r=1}^{n} u_r y_{rj}}{\sum_{i=1}^{m} v_i x_{ij}}, j = 1, 2 \ldots, t \quad (11)$$

3.2 Intelligent Decision Design

3.2.1 Design and Architecture

Group decision support system organically combines communication technology, computer technology, and decision theory, and its research contents mainly include the establishment of decision support system framework and system development.

With the introduction of multimedia storage technology, the information that can be extracted is no longer limited to text data, which makes the data that can be referred to in group intelligent decision-making increase, and the reliability of decision-making has been greatly improved.

Combined with the project types of various enterprises and the characteristics of dynamic group decision-making, this paper proposes a decision-making system architecture based on group decision-making theory, integrated framework, and intelligent technology, as shown in Figure 7. The main part is composed of resource layer, intelligent decision-making layer and interaction layer from bottom to top. Detailed design and analysis will be carried out below.

The interaction layer has both input and output functions. Extract system data and relevant functional modules by accepting and checking user requests. Through the display platform, the analysis results are provided for decision-makers, and the decision results are visually displayed, so as to provide a more comprehensive reference for enterprise decision-making and planning.

As the middle level of the system, the intelligent decision-making layer plays an important role in the effective operation of the system. Intelligent decision-making is mainly accomplished by group decision-making, multimedia storage, cloud computing, and other technologies. Based on the resource layer and supported by intelligent decision analysis, the functions of the system are realized, and the results that can be used for practice are formed.

The resource layer is divided into six databases, namely, the expert database, model database, knowledge database, data warehouse, method database, and document database. Through comprehensive integration, the overall control of each library is carried out. The comprehensive integration has the functions of overall scheduling, collaborative planning, communication, etc., so as to realize the sharing and writing of multi-library resources, and then realize the use and effective management of each library.

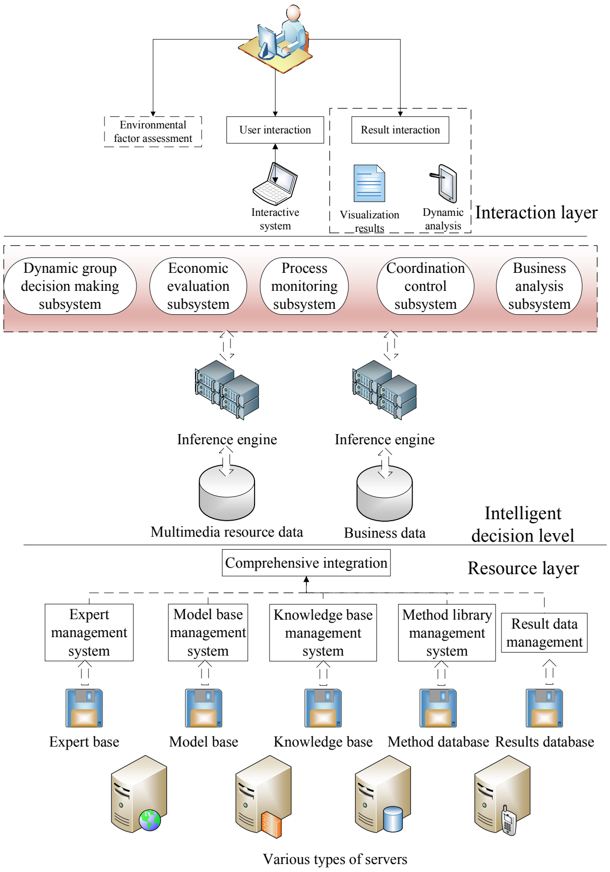

Fig. 7: A decision-making system architecture based on group decision-making theory

3.2.2 Functions

Its main functions include:

(1) Combined with the characteristics of enterprise data, massive financial, operational, and economic data are organized according to certain rules to form a comprehensive data layer, and further combined with relevant operations and management to provide data support for decision-making.

(2) Realize the query and operation of data, knowledge discovery, and result generation.

(3) It mainly adopts multi-dimensional analysis, combined with SWOT, radar chart, and other forms, combined with industry or international benchmarking, and carries out enterprise driving factor analysis and advantage analysis from different dimensions to form an overall description of enterprise operation.

(4) According to the needs of different decision makers, the method is selected to form the analysis results of multi-scenario

(5) Through the formation of visualization and dynamic display, it is convenient for managers and decision-makers to grasp the continuity and development trend of major decision-making matters, realize real-time tracking, and form dynamic management and decision-making.

The Group Decision Support System (GDSS), as an important tool in modern decision science, cleverly integrates communication technology, computer technology, and decision theory. Its research scope is broad, covering not only the construction of decision support system frameworks but also delving into various aspects of system development. With the innovative introduction of multimedia storage technology, the information we can extract and analyze has far exceeded the traditional scope of text data. Various forms of multimedia data such as images, audio, and video provide richer and more diverse reference bases for group intelligent decision-making, significantly enhancing the accuracy and reliability of decision-making. In response to the diversity of project types and the uniqueness of dynamic group decision-making in various enterprises, this paper proposes a new decision-making system architecture based on the deep integration of group decision-making theory, integrated framework, and intelligent technology, as shown in Figure 7. This architecture consists of three core components from bottom to top: resource layer, intelligent decision-making layer, and interaction layer, each carrying specific functions and missions.

As a bridge between the system and users, the interaction layer bears the dual responsibility of input and output. On the one hand, it can accurately receive and verify user requests, extract system data based on the request content, and activate corresponding functional modules; On the other hand, through an intuitive display platform, the analysis and decision-making results are clearly presented to decision-makers, enabling them to quickly grasp the key points of decision-making and provide comprehensive and in-depth references for enterprise strategic planning and decision-making. As the central brain of the system, the intelligent decision-making layer plays a crucial role in the smooth operation of the system. It fully utilizes cutting-edge technologies such as group decision-making, multimedia storage, and cloud computing, and conducts in-depth intelligent decision analysis based on data support provided by the resource layer. By integrating and optimizing various decision resources and algorithms, the intelligent decision-making layer can efficiently implement system functions and output decision results with practical value.

4 Application of Economic Intelligent Decision-making Platform

4.1 Display of Analysis Results

After an Internet company uses the decision-making platform for analysis, its investment distribution is shown in Figure 8.

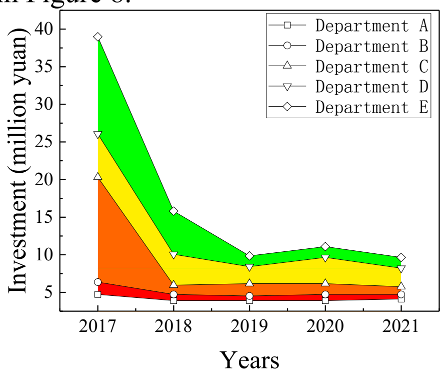

Fig. 8: The investment distribution

The results show that the investment distribution of each department of the enterprise has decreased year by year and reached a stable level in the past three years. This phenomenon shows that the company has ended the expansion of the market, and the next stage should consider how to improve the product content.

The performance distribution is shown in Figure 9.

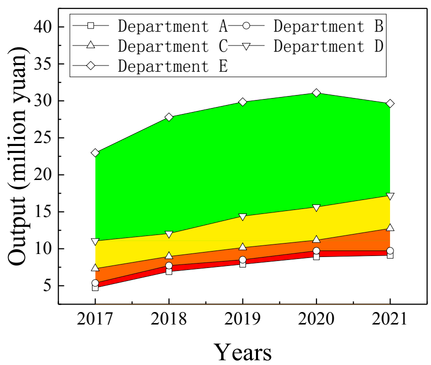

Fig. 9: The performance distribution

The results show that the output of each department of the enterprise increases year by year. This phenomenon shows that the company’s performance is good and there is no need to make too many adjustments to the industrial structure.

The dimension of traditional decision-making analysis is limited to its own business scope. The management’s decision-making depends more on the existing data and its own professional judgment, and the subjective component is high. The analysis result improves the problem that the presentation mode of the report is relatively single. The online implementation of the intelligent decision-making platform changes the output form of data from charting to visualization. The report shows a wider dimension, the granularity of analysis is finer, and the timeliness of the report is higher.

Compared with traditional decision analysis, intelligent decision platforms have demonstrated significant advantages in data analysis and report presentation. The dimensions of traditional decision analysis are often limited to the business scope of the enterprise itself, and management decisions rely more on existing data and their own professional judgments, with a highly subjective component. The intelligent decision-making platform can utilize big data and artificial intelligence technology to deeply mine and analyze massive amounts of data, thereby providing more comprehensive and accurate decision support for enterprises. In addition, the intelligent decision-making platform has also improved the problem of traditional report presentation being relatively simple. By transforming the output format of data from charts to visual reports, intelligent decision-making platforms can provide a broader perspective of analysis, finer-grained data display, and higher timeliness of reporting. This enables the management to have a more intuitive and rapid understanding of the company's business situation and development trends, thereby making more informed decisions.

4.2 Case Application

Based on the economically intelligent decision-making platform, the Internet company has made adjustments in its management system and finance in recent years. All measures have effectively improved the company’s performance.

The following adjustments have been made:

1. Centralized financial control to ensure the effective use of the group’s capital assets and the realization of the group’s strategic objectives.
2. Optimize resource allocation to maximize enterprise value;
3. Organizational structure optimization: its 220 subsidiaries and branches all use the decision-making platform for management;
4. Standardization of data and accuracy of elements. All contracts and invoices are standardized;
5. Improve the flexibility of employee services, and employees can collect information and process business without being restricted by organization and region;
6. Reduce the operating cost of the enterprise, reduce the duplication of institutions and financial personnel through the sharing of financial resources, and reduce the total financial cost.

In terms of finance, the company’s economy has further changed its thinking mode, business mode, and management mode through the application of intelligent decision-making platform system, forming an important support for the company’s performance growth. The measures not only improve the integration ability of the enterprise but also strengthen the financial control. At the same time, paperless financial vouchers have been realized, and electronic signature and electronic signature technology have been developed to improve the efficiency and quality of financial services.

5 Conclusion

With the rapid development of information technology, multimedia data has become an indispensable source of information for enterprise decision-making. These data not only contain traditional text and numerical information, but also encompass various forms such as images, videos, and audio, providing a richer and more intuitive perspective for decision-making. However, the massive, diverse, and high real-time requirements of multimedia data pose serious challenges to storage and processing capabilities. Therefore, applying distributed storage technology to cloud multimedia systems has become an important cornerstone for building an economically intelligent decision-making platform. Distributed cloud multimedia storage technology achieves flexible configuration and dynamic expansion of storage resources by dispersing multimedia data in multiple physical locations and utilizing networks for efficient data transmission and sharing. This technology not only improves the security and reliability of data, but also significantly enhances data processing speed and efficiency through parallel processing, load balancing, and other means. At the same time, it also supports cross-platform and cross-device data access, providing strong data support for the economically intelligent decision-making platform. Through diverse data sources and efficient data collection mechanisms, the platform is able to collect various types of data both inside and outside the enterprise in real time and accurately, including market trends, competitor dynamics, customer demands, production and operation status, etc. By utilizing distributed cloud multimedia storage technology, the platform achieves efficient and secure storage of multimedia data, and supports fast retrieval and sharing, providing a solid foundation for subsequent data processing and analysis.

(1) The storage rate and energy consumption of cloud multimedia decrease with the increase of memory m, but the average queue length increases with the increase of memory M. At the same time, with the increase of memory, the transmission rate and energy consumption will first decrease and then tend to be flat, while the average queue length will continue to increase.

(2) The multi-objective programming is applied to the economic evaluation model. Economic evaluation involves multiple levels and factors. And all levels and factors are interrelated. According to the characteristics of each enterprise's economic evaluation, the content of multimedia data is fully considered, and the influencing factors are summarized into four aspects: policy factors, capital factors, enterprise's own factors, and human capital factors.

(3) Combined with the project types and dynamic group decision-making characteristics of various enterprises, the group decision-making theory, integrated framework, and intelligent technology are applied to the decision-making architecture. The platform can provide data support for decision-making by combining relevant operations and management. Realize data query, operation, knowledge discovery, and result generation. From different dimensions, carry out enterprise driving factor analysis and advantage analysis to form an overall description of enterprise operation.

Declaration of Generative AI and AI-assisted Technologies in the Writing Process

The authors wrote, reviewed and edited the content as needed and they have not utilised artificial intelligence (AI) tools. The authors take full responsibility for the content of the publication.

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Conflict of Interest

The authors have no conflicts of interest to declare.