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The Role of Data Fusion Internet Cloud Computing in Enterprise Economic Data Management System

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Today, big data has become a major resource for enterprises worldwide. Given the massive and increasing amount of enterprise data being generated, it makes sense for companies to focus on the processing and analysis of economic data to create more value for their enterprise and adapt to the changing economic environment. As an emerging technology, cloud computing is welcomed by an increasing number of enterprises and users because of its convenience, directness and low cost. Cloud computing offers a new business model, which makes the operation and management of enterprises more intelligent, and also provides a scientific basis for their operations and decision-making. Based on data fusion technology and using the Internet cloud computing platform, in this paper, a financial analysis is conducted of the corporate economic data of Xingang Group, and the predicted and actual values of financial and economic indicators in each quarter of 2021 are analyzed and compared. The results show that the average error rate of the Internet cloud computing platform's operating income forecast is 12%, and the average error rate of operating costs is 3.8%; the operating profit margin forecast has an average error rate of 10.3%, and the ROE forecast has an error rate of 1.5%.

Keywords: Internet cloud computing, data fusion, economic data processing, enterprise management, financial analysis

1. INTRODUCTION

In today's era of big data, information and knowledge are gradually becoming indispensable resources for enterprises. At present, many companies in developed countries are focusing on developing the knowledge economy. By using modern information technology, they can explore the implications of economic data and enhance their core capabilities. After the 18th National Congress of the Communist Party of China, China regards the"substantial increase in the level of informatization" as an important indicator for building a moderately prosperous society in an all-round way, achieving sustainable economy development, and improving overall national strength. In the current social and economic situation, the way that Chinese enterprises can improve their own value through information technology is an important topic in the informatization of Chinese enterprises. The key to enterprise informatization lies in the informatization of economic data. The collection and analysis of a large amount of economic data inside and outside an enterprise can be achieved via the Internet, and can provide a scientific basis for the enterprise's business decision-making. With the continuous development of the Internet of Things technology, cloud computing has gradually penetrated into major industries as it offers several advantages including low cost, large storage space, and high processing speed. China has begun to implement the "cloud" national informatization plan, which is based on cloud

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computing and strongly supports "big data". The collection, clustering and analysis of enterprise data is facilitated by cloud technology and data fusion technology. This not only solves the problem of high cost in the traditional accounting model, but also greatly improves the efficiency of data analysis particularly in regard to financial data, and strengthens its relevance.

In recent years, new technologies such as data fusion and Internet cloud computing have emerged. In information construction, service operation mode, communication management and other enterprise fields, these technologies have a broad range of applicability. However, at present, in terms of cloud computing and data fusion, the research on enterprise economic data management system has just begun, and there is still much room for development. In this paper, several articles related to Internet cloud computing and data fusion are examined from a theoretical perspective. Based on the theories relevant to Internet cloud computing and data fusion, the cloud computing platform is used to analyze and predict the economic indicators of enterprises and verify the prediction accuracy of the platform.

2. RELATED WORK

At present, Internet cloud computing is a very active research direction, and scholars in China and abroad have conducted a great deal of research on the key technologies and specific applications of cloud computing. Xia et al. (2017) designed a cloud computing image retrieval application system based on privacy protection and anti-copy content, which supports the content protection of encrypted images and prevents sensitive information from being leaked to cloud servers. The steps of this scheme are as follows: First, the corresponding image is represented by a feature vector. Then, a pre-filtering table is constructed, using locality-sensitive hashing to improve the retrieval effect. In addition, the feature vector is protected with a KNN-based security algorithm, and the image is encoded with a standard stream cipher. Since authorized query users may illegally copy and distribute captured images to unauthorized persons, the researchers [1] propose a watermark-based protocol to prevent such illegal distribution. Finally, the security and feasibility of the scheme are verified by experiments. In order to solve the problem of high computational overhead and poor data security in cloud data sharing, which seriously hinders resource-constrained mobile device customization services, Jin et al. (2018) proposed a new attribute-based data sharing scheme, which provides attribute-based security data for users with limited cloud computing resources. In addition to taking part of the encryption calculation offline, this scheme also reduces most of the computing tasks by adding system public parameters. Furthermore, the public ciphertext testing phase is performed before the decryption phase, which eliminates the large computational overhead due to illegal ciphertexts. For data security, this paper uses the chameleon hash function to generate instant ciphertext, and then filters the offline ciphertext to obtain the final online ciphertext [2]. Yi et al. (2017) investigated how a virtual machine distribution strategy can be used to defend against co-resident attacks in cloud computing, and discussed ways to improve virtual machine distribution strategy to make it difficult for attackers to share location information with targets. The design steps are as follows: First define the security metrics used to evaluate the attack. Then, model these metrics and compare the difficulty of achieving co-localization under the three commonly used protocols. Finally, a new strategy is proposed, which can not only reduce the threat of attack, but also achieve load balancing and low power consumption. Finally, the effectiveness of this strategy is implemented, tested and proved on the open source platform OpenStack [3]. Hirai et al. (2017) analyzed the performance of massively parallel distributed processing and backup tasks in cloud computing, and modeled the task scheduling server as a single-server queue, where the server consists of multiple workers. When a task enters the server, it is split into multiple subtasks, each subtask being served by its own auxiliary task and a different auxiliary task. In this process, the subtask processing time of workers obeys Weibull distribution or Pareto distribution. The paper compares the average response time and total processing time between backup task scheduling and normal scheduling. Numerical results show that the efficiency of backup task scheduling largely depends on the processing time distribution of workers [4]. Investigating the competitive characteristics of multi-tenant environments in cloud computing, Wei et al. (2018) proposed a cloud resource allocation model based on the Incomplete Information Stackelberg Game (CSAM-IISG) using the Hidden Markov Model (HMM). First, based on demand, a Hidden Markov Model is used to predict the current bids of service providers. The researchers [5] established the Incomplete Information Stackerberg Game (IISG) by dynamically predicting bids. The IISG encourages service providers to choose the best bidding strategy based on overall utility in order to maximize profits. Thirdly, based on resource prices, a resource allocation model is proposed to ensure that infrastructure suppliers obtain optimal benefits. The simulation results show that the price predicted by the model is close to the real transaction price and lower than the real value. This model enables both service providers and infrastructure vendors to obtain higher profits [5]. Based on cloud computing, Wang et al. (2017) proposed an efficient encryption mechanism based on file-level features, which integrates the multi-layer access structure into a single access structure, and then uses the integrated access structure to encrypt the multi-layer files, so as to realize and attribute relevant ciphertext elements are shared. In this way, the storage capacity of the ciphertext will be greatly reduced while simultaneously saving a great deal of encryption time. The experimental results show that the scheme has high encryption and decryption performance, and with an increase in the number of documents, its superior performance becomes more evident [6]. In order to improve the scalability, availability and sustainability of data storage, Barsoum and Hasan (2017) proposed a mapping-based multi-copy dynamic data sharing (MB-PMDDP) scheme in cloud computing systems. The scheme has the following characteristics: 1) It provides customers with evidence that the CSP is not deceived by storing fewer copies; 2) Support dynamic data outsourcing, that is, support block-level operations such as block modification, insertion, deletion, and appending; 3)

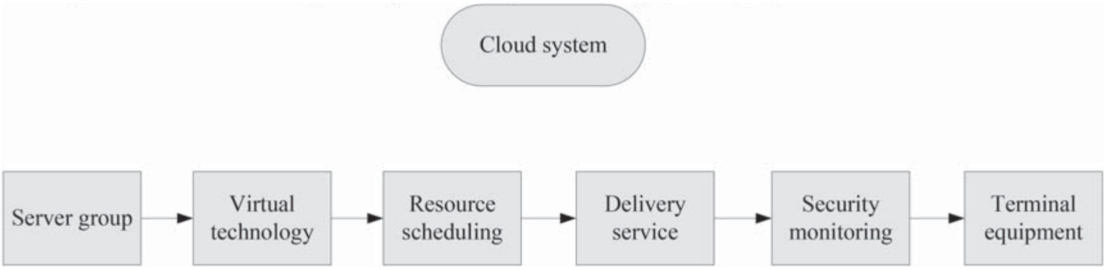

Figure 1 Cloud computing usage patterns.

Table 1 Three cloud computing service models.

Resource category	Cloud computing service model
Application	Software as a Service
System platform	Platform as a Service
Infrastructure	Infrastructure as a Service

It allows authorized users to seamlessly access file copies stored by CSP [7].

3. TECHNICAL FOUNDATION OF ENTERPRISE ECONOMIC DATA MANAGEMENT SYSTEM

3.1 Cloud Computing

Cloud computing is generated by large Internet companies such as Google and IBM when they process massive amounts of data. In 2006, Google formally introduced the concept and theory of "cloud computing" in its "Google 101 Plan". Since then, Internet companies around the world have gradually begun to study cloud computing, and multinational companies such as Amazon, IBM, Yahoo, Microsoft, and Salesforce have all regarded it as the focus of their company development [8–9]. This new way of organizing, allocating and utilizing computing resources is helpful for the rational allocation of computing resources, effectively improving the utilization rate of resources, thereby promoting energy saving and reduction, and achieving green computing [10].

Cloud computing provides enterprises with a new business computing service model, that is, a computing model offering software as a service, resource virtualization and system transparency. It is a technical means and implementation that makes computing resources a social infrastructure for the masses, and has a profound impact on information technology itself and its applications [11]. Figure 1 shows the application model diagram of cloud services, in which the server group provides various data and information resources for the system, and the cloud system uses virtual technology for flexible computing and transmission. The cloud service manager is used to provide and manage various cloud services such as IaaS, PaaS, SaaS in a unified manner, and to ensure data security and service reliability through a security monitoring system [12].

The cloud computing service model has three modes of service delivery: Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS), as shown in Table 1. At the Infrastructure-as-a-Service (IaaS) level, companies provide infrastructure for storage devices, networking equipment, and more. Virtualization, distributed storage, and massive database storage are used to promote the development of mobile computing technology. Platform as a Service (PaaS) is a service that provides users with language development tools such as test environment and deployment environment based on cloud computing facilities. Its development environment is friendly, the service is rich, the expansibility is strong, and the integration rate is high. Software as a Service (SaaS) is the most commonly-used and direct cloud service. Users can directly use applications running on the cloud by means of a browser through the network. When cloud computing providers maintain and manage cloud computing software and hardware devices, they can charge users in the form of free or pay-as-you-go, and users can use the application directly without worrying about software installation and maintenance. From the perspective of cloud service providers, software as a service is the software computing capabilities provided by cloud service providers to meet the specific needs of users [13]. The specific hierarchical structure diagram is shown in Figure 2.

Cloud computing is one of the fastest developing fields of the information industry in the world today, and it is also an important development direction of the IT industry [14,15]. Figure 3 shows the scale of the global cloud computing market. From 2016 to 2020, the cloud computing market has grown steadily. However, due to the impact of the epidemic, the global economy has experienced a severe contraction in 2020, and the growth of the global cloud computing market has slowed down from 20.9% in 2019 to 13.1%, with a market size of US$208.3 billion [16]. At the same time, the development of China's cloud computing market has shown a strong momentum. The market size of the entire industry has reached 209.1 billion yuan, an increase of 26.1% compared with 2019. Table 2 shows the market size of global cloud computing IaaS, PaaS and SaaS. In 2020, global IaaS and PaaS will grow steadily, with growth rates of 33.3% and 23.5%, respectively [17]. While the global SaaS development has stagnated due to the impact of the new crown virus, the growth of the SaaS market is expected to peak in the next few years.

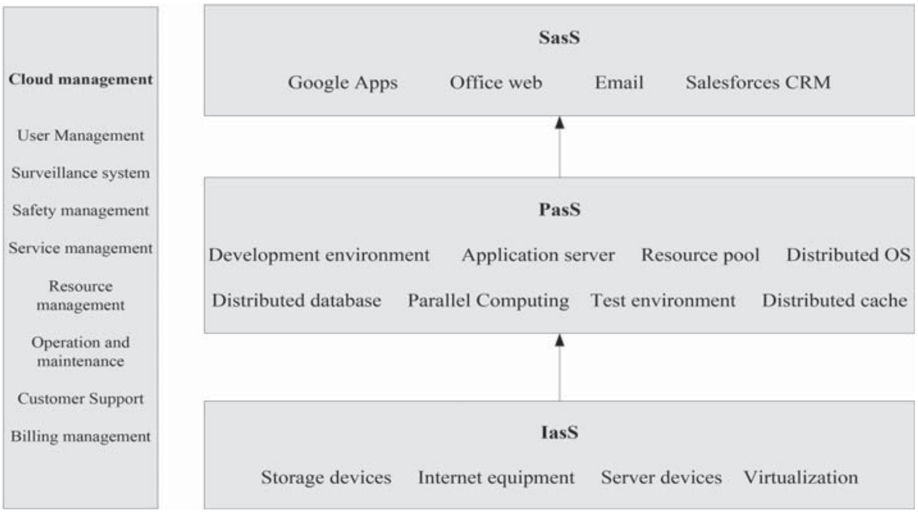

Figure 2 Cloud computing architecture diagram.

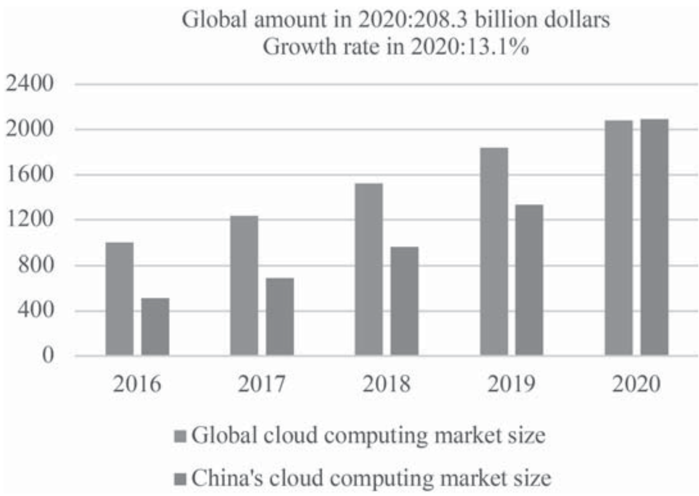

Figure 3 Global cloud computing market size chart.

Table 2 Market size of global cloud computing segment.

	IaaS	PaaS	SaaS
2016	223	118	658
2017	283	152	803
2018	340	276	907
2019	445	375	1021
2020	592	463	1028

3.2 Data Fusion

Data fusion of information involves the multi-level processing of multi-source data. Each level represents a different level of abstraction from the original data, including data detection, association, estimation, and combination processes [18]. According to the degree of abstraction in the data processing level, data fusion can be divided into three levels: data-level fusion, feature-level fusion and decision-level fusion.

3.2.1 Data-level fusion (low-level or pixel-level)

Figure 4 shows the process of data-level fusion. First, the data information collected by all sensors is fused, and then the fused data is used to extract and distinguish feature vectors. Data-level fusion refers to direct fusion at the level of raw data and comprehensive analysis of the original data, which is the most basic fusion [19,20]. The advantage of data-level fusion is that it can retain a large amount of field data and provide details that other fusion levels cannot provide; however, it involves a large amount of data, high processing cost, and poor real-time performance. Due to the characteristics of incompleteness, uncertainty and instability of sensor information, high error correction capability is required during fusion.

When the original data has undergone minor processing, data level merging can be performed to preserve the original data as much as possible.

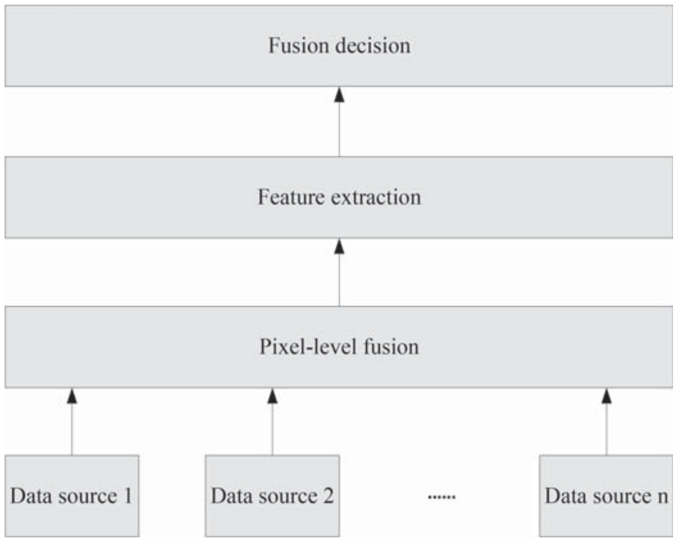

Figure 4 Block diagram of data-level fusion.

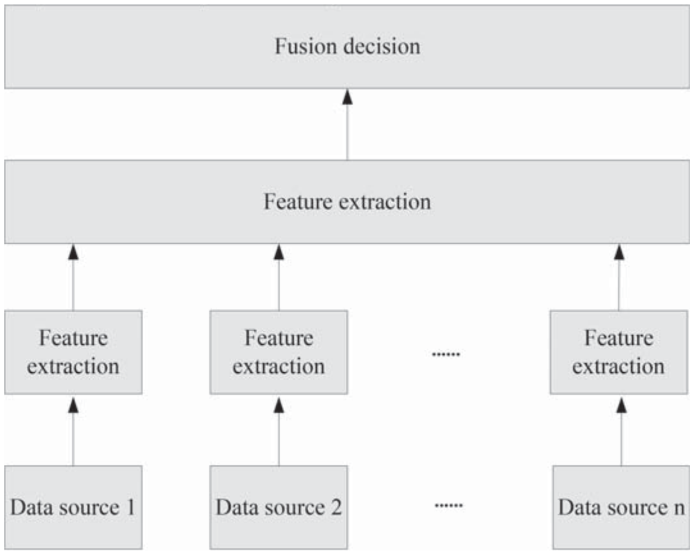

Figure 5 Block diagram of feature-level fusion.

3.2.2 Feature-level fusion (intermediate or feature-level)

Figure 5 depicts the feature-level fusion process. First, the data with typical characteristics are extracted from different data collectors, merged into a single feature vector, and processed by pattern recognition technology. Before fusion, the data is compressed to some extent for real-time processing. At the same time, the method can retain some important characteristics of the target, and the extracted fusion characteristics have a direct relationship with decision inference, so as to realize the attribute estimation of the target. Its fusion accuracy is lower than the pixel layer [21,22].

3.2.3 Decision level fusion (advanced or decision level)

The decision-level fusion processing process is shown in Figure 6, where, before fusion, the data sources of each sensor are converted to obtain an independent identification. The system obtains the overall consistency by combining the attribute judgment results of each sensor with a certain standard and reliability [23]. The method has good fault tolerance and real-time performance, is suitable for many types of sensors, and can work under one or more groups of fault conditions. However, it has the disadvantage of incurring a high processing cost.

Table 3 lists the advantages and disadvantages of the three levels of data fusion described above. The results show that although pixel-level fusion can provide fine information for objects, it needs to process a large amount of information, with large communication volume and poor anti-interference performance. The decision-level fusion has better fault tolerance, less communication and stronger anti-interference, and can be used for many different types of sensors. However, its preprocessing cost is high. The fusion at the feature level combines the advantages and disadvantages of the first two levels.

The way a system's data is fused depends on its specific needs, and there is no one-size-fits-all structure that fits every

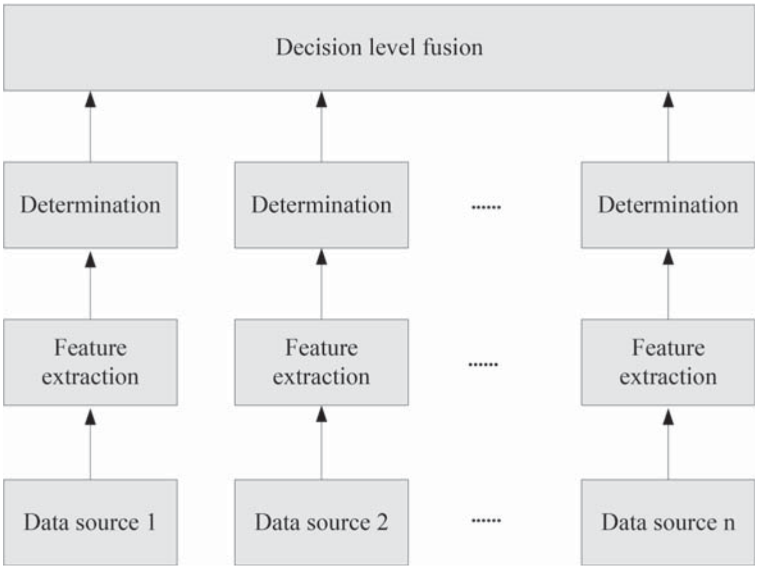

Figure 6 Block diagram of decision-level fusion.

Table 3 Performance Comparison of Three Fusion Levels.

Fusion model	Precision	Anti-interference	Real-time	Communication data volume	Fusion level
Pixel level	High	Strong	Excellent	Large	Low
Feature level	Medium	Medium	Medium	Medium	Medium
Decision level	Low	Weak	Poor	Small	High

Table 4 Commonly-used methods for different fusion layers.

Fusion level	Common method
Data layer	Least Squares, Maximum Likelihood Estimation, Kalman Filtering
Feature layer	Neural network, cluster analysis method, logic template method
Decision-making level	Bayesian Estimation, D-S Evidence Reasoning, Fuzzy Integral Method

situation or application. In practical applications, factors such as sensor performance, computing power, communication bandwidth, expected accuracy, and financial capacity should be fully considered. Moreover, in the same system, fusion can also be carried out from different levels, and the fusion system in practical application is often a combination of these three fusions [24–25].

The better the degree of fusion, the faster will be the processing speed. Table 4 summarizes the methods commonly used for the three fusion layers.

(1) Kalman filter fusion algorithm

Since its appearance, the Kalman filter algorithm has been widely used in various fields due to its excellent performance. The main function of the Kalman filter is to process the noisy measured data, so as to obtain mathematical random estimation. There are only two moments of target state data that need to be processed. Because less memory is required, Kalman filtering requires less computation and achieves better real-time performance. The Kalman filter fusion algorithm is described by some mathematical formulas. If the pre-set conditions are met, the covariance of the estimation error can be minimized, and the state at the next moment can be estimated by the change of the observation vector [26]. The algorithm involves two processes: time update and measurement update.

Assuming that the motion system of the target is a linear system, its state model and measurement model are as shown in (1) and (2):

$$X(k) = \Phi(k/k-1)X(k-1) + W(k-1) \quad (1)$$

$$Z(k) = H(k)X(k) + V(k) \quad (2)$$

where $X(k)$ represents the state vector of the target, $\Phi(k/k-1)$ represents the state transition matrix of the target motion law, $Z(k)$ is the measurement value of target tracking, $H(k)$ is the measurement matrix is the independent mean value of each other, $W(k)$ and (k) is a white noise sequence of zero.

Assuming that Q and R are the covariance matrices of the system process and measurement noise, respectively, the following relationship is satisfied:

$$E\left[V(k)V^T(k)\right] = R(k)\delta_{k,j} \quad (3)$$

$$E\left[W(k)W^T(k)\right] = Q(k)\delta_{k,j} \quad (4)$$

$$E\left[V(k)W^T(k)\right] = 0 \quad (5)$$

The Kalman filter algorithm is an iterative process expressed as:

The one-step prediction of the target state is:

$$\widehat{X}(k/k-1) = \Phi(k/k-1)\,\widehat{X}(k-1/k-1) \quad (6)$$

The one-step forecast mean squared error is:

$$P(k/k-1) = \Phi(k/k-1)\,P(k-1/k-1) \cdot \Phi^T(k/k-1) + Q(k-1) \quad (7)$$

The filter gain matrix is:

$$K(k) = P(k/k-1)\,H^T(k)\,[H(k)P(k/k-1) \cdot H^T(k) + R(k)\Big]^{-1} \quad (8)$$

The filtered mean square error is:

$$P(k/k) = [I - K(k)H(k)]\;P(k/k-1) \quad (9)$$

The state filter value is:

$$\widehat{X}(k/k) = \widehat{X}(k/k-1) + K(k) \times \left[Z(k) - H(k)\widehat{X}(k/k-1)\right] \quad (10)$$

The time update equation estimates the state vector and error for the next second through the transfer matrix, the target state at the current moment, and the covariance matrix of the error, which is the one-step prediction process in Equation (6) and Equation (7) [27]. The measurement update equation compares the actual observed data with the predicted data, and combines the measured value with the predicted value to obtain the final estimation result [23]. The feedback information is represented by the filtered gain matrix in Equation (8). Lastly, the final error information and target state information are calculated by Equations (9) and (10).

(2) Adaptive Kalman Filtering Algorithm

In linear systems with known equations of state and systems of observed differential equations, a simple adaptive Kalman filter method is generally used, but in the target tracking problem of nonlinear systems, the extended Kalman filter algorithm (EKF) is usually used. After linearizing the nonlinear function, the adaptive Kalman filter can be used for Kalman filtering. However, when solving nonlinear functions, because it needs to solve Jacobian matrix at the same time, it cannot be applied to some non-differentiable occasions. When the higher-order nonlinear function of the nonlinear Taylor series expansion is roughly ignored, its linearization will also cause a large deviation of the system [28].

In the case of targets with high maneuverability, it is difficult to simulate with a fixed motion pattern. It must then be adjusted to match the target's motion state. The adaptive Kalman filter algorithm corrects the model by identifying the motion of the target. It combines Kalman and adaptive filtering to create a scalable adaptive Kalman filtering algorithm. The algorithm judges the maneuverability of the object according to the change of acceleration. Here is the handler:

$$\overline{a_k} = \widehat{x_{k/k-1}} \quad (11)$$

$$\sigma_a^2 = \frac{4-\pi}{\pi}(a_{max} - \overline{a_k})^2 \quad (12)$$

In Equation (11), $\overline{a}(t)$ is the mean value of the maneuvering acceleration at the "current" moment. $\widehat{x_{k/k-1}}$ is the acceleration prediction component of state estimation. σ_a^2 is the modified Rayleigh distribution variance of the maneuvering acceleration. In the application of the algorithm, a_{max} and the reciprocal α of the maneuvering time constant need to be selected according to the actual tracking situation, and the two play an important role in the ensuring the accuracy of the tracking.

The transition matrix Φ used is:

$$\Phi = \begin{bmatrix} 1 & T & (-1+\alpha T + e^{-\alpha T})/\alpha^2 \\ 0 & 1 & (1-e^{-\alpha T})/\alpha \\ 0 & 0 & e^{-\alpha T} \end{bmatrix} \quad (13)$$

where T is the target sampling period. The covariance matrix of the system process noise is:

$$Q_K = 2\alpha\sigma^2 \begin{bmatrix} q_{11} & q_{12} & q_{13} \\ q_{21} & q_{22} & q_{23} \\ q_{31} & q_{32} & q_{33} \end{bmatrix} \quad (14)$$

The expression of each parameter in Q_K is as follows:

$$q_{11} = \frac{1}{2\alpha^5}\left[1 - e^{-2\alpha T} + 2\alpha T + \frac{2\alpha^3 T^3}{3} - 2\alpha^2 T^2 - 4\alpha T e^{-\alpha T}\right] \quad (15)$$

$$q_{12} = \frac{1}{2\alpha^4}\left[1 + e^{-2\alpha T} - 2e^{-\alpha T} + 2\alpha T e^{-\alpha T} - 2\alpha T + \alpha^2 T^2\right] \quad (16)$$

$$q_{13} = \frac{1}{2\alpha^3}\left[1 - e^{-2\alpha T} - 2\alpha T e^{-\alpha T}\right] \quad (17)$$

$$q_{22} = \frac{1}{2\alpha^3}\left[4e^{-\alpha T} - 3e^{-2\alpha T} + 2\alpha T\right] \quad (18)$$

$$q_{23} = \frac{1}{2\alpha^2}\left[1 + e^{-2\alpha T} - 2e^{-\alpha T}\right] \quad (19)$$

$$q_{33} = \frac{1}{2\alpha}\left[1 - e^{-\alpha T}\right] \quad (20)$$

This filtering method introduces the non-zero mean value $\widehat{x_{k/k-1}}$ of the acceleration into the target motion equation, so that the error σ_a^2 changes with $\widehat{x_{k/k-1}}$, causing the change of the Q matrix.

4. EXPERIMENT DESIGN OF ENTERPRISE ECONOMIC DATA MANAGEMENT SYSTEM

In this paper, we integrate the accounting data of Xingang Group, and improve the accuracy of managers' decision-making, the rationality of budget control, and the timeliness

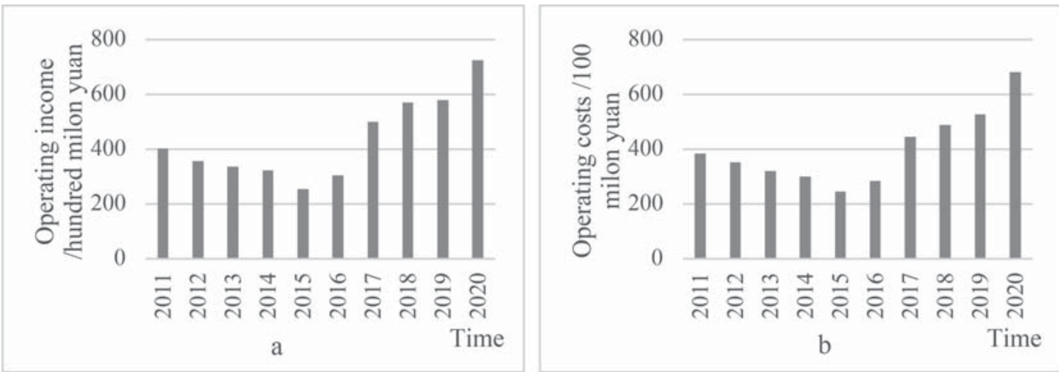

Figure 7 The operating income and operating costs of the company from 2011 to 2020.

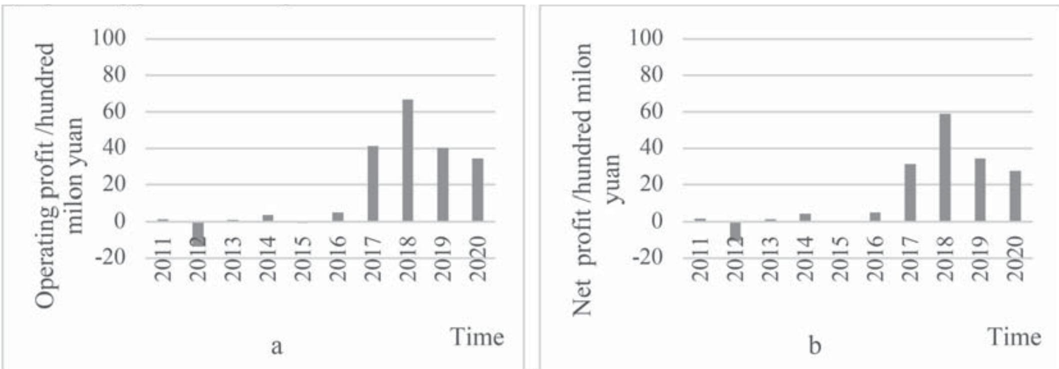

Figure 8 The operating profit and net profit of the company from 2011 to 2020.

of financial monitoring through intelligent analysis of cloud computing. All the financial data for the Xingang Group from 2011 to 2020 is imported into the Internet cloud computing platform based on data fusion, and the financial occurrence of operating income, operating cost, operating profit margin and return on equity in 2021 are predicted. Now we have the actual financial situation of this enterprise from 2011 to 2020, and the accuracy of the platform's forecast can be verified by comparing the predicted number with the actual number.

(1) Operating income and operating costs

Figure 7a shows the company's operating income from 2011 to 2020, while Figure 7b shows the annual operating cost of the company from 2011 to 2020.

As shown in Figure 7, the development of Xingang Group was relatively sluggish from 2011 to 2015, and its operating income decreased year by year. It fell from 40.23 billion yuan in 2011 to 25.37 billion yuan in 2015, its lowest year. However, after the company adjusted its business strategy in 2016, the operating income increased significantly. It went from 30.46 billion yuan in 2016 to 49.97 billion yuan in 2017, to 56.96 billion yuan in 2018, and 57.90 billion yuan in 2019. In 2020, the company's operating income reached 72.41 billion yuan, with an annual growth rate of 25%. Correspondingly, operating costs have also increased. In 2020, the company's operating costs were 68.12 billion yuan, with an annual growth rate of 29.2%. In order to fully study the economic data of Xingang Group, it is necessary to analyze the corporate profits.

(2) Operating profit and net profit

Figure 8a shows the operating profit of the company from 2011 to 2020, while Figure 8b shows the net profit of the company from 2011 to 2020.

As can be seen from Figure 8, Xingang Group's profits were relatively low from 2011 to 2015, and its operation in 2012 was particularly bleak. The company's net profit was -1.04 billion, and it was in a state of debt, and the profits in the next two or three years were around 200 to 300 million. The company began to take off in 2016, with an operating profit of 510 million yuan; in 2017, the operating profit doubled to 4.11 billion yuan, and rose to 6.675 billion yuan in 2018. However, due to the impact of the epidemic, both operating profit and net profit in 2019 and 2020dropped significantly. In 2019, the operating profit was 4.03 billion yuan, and the net profit was 3.43 billion yuan; in 2020, the operating profit fell to 3.44 billion yuan, and the net profit fell to 2.75 billion yuan. Enterprises still need to find a strategy suitable for enterprise development in the post-epidemic era in order to survive and grow.

(3) Forecast operating income and operating costs

Figure 9a shows the company's actual and forecast operating income for each quarter of 2021. Figure 9b shows the company's actual and forecast operating costs for each quarter of 2021.

Figure 9 shows operating income and operating costs, operating profit and net profit from 2011 to 2020. The

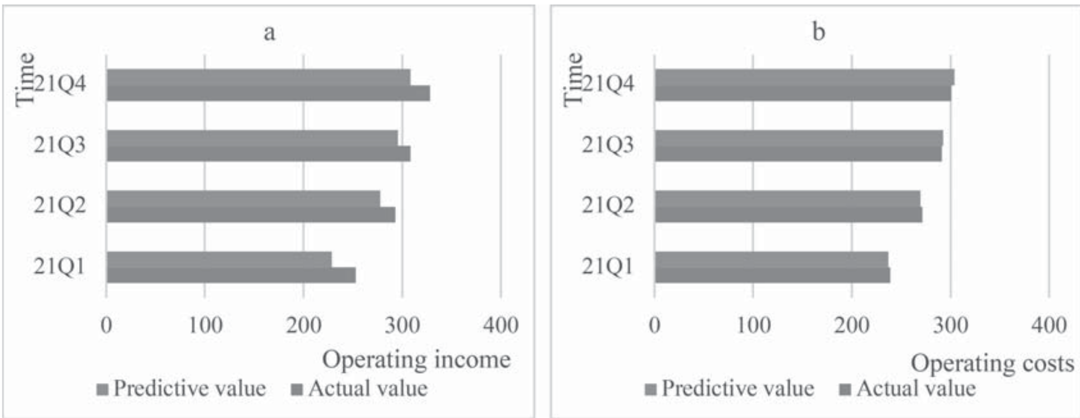

Figure 9 The operating income and cost forecast chart of the company in 2021.

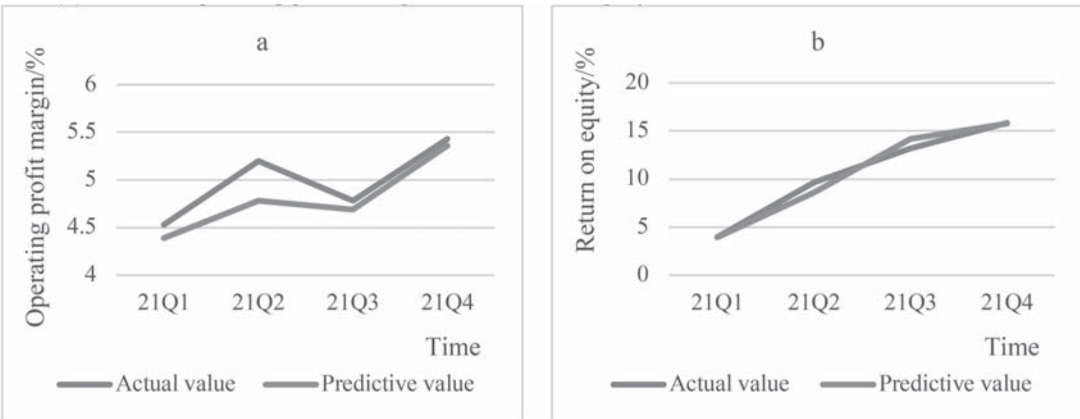

Figure 10 The profit margin income and ROE forecast chart of the company in 2021.

Internet cloud computing platform based on data fusion can automatically draw the forecast trend line for each quarter of 2021, and then compare it with the actual operating income and operating cost of each quarter in 2021. The prediction accuracy of the cloud computing platform is verified by comparing the predicted value with the actual value. It is predicted that the operating income in the first quarter of 2021 will be 22.84 billion yuan, and the actual income will be 25.31 billion yuan; the operating income in the second quarter is predicted to be 27.76 billion yuan, and the actual income is 29.3 billion yuan; the operating income in the third quarter is predicted to be 29.58 billion yuan, and the actual income is 30.84 billion yuan; it is predicted that the operating income in the fourth quarter will be 30.82 billion yuan, and the actual income will be 32.79 billion yuan. The average error rate of operating income forecast is 12%, and the cloud computing platform's forecast of operating income is still relatively conservative. In 2021, when epidemic recovery began, the operating income rebounds significantly. The forecast value of operating costs in the first quarter of 2021 is 23.72 billion yuan, and the actual value is 23.92 billion yuan; the forecast value of operating costs in the second quarter is 26.94 billion yuan, and the actual value is 27.16 billion yuan; the predicted value of operating costs in the third quarter was 29.25 billion yuan, and the actual value was 29.14 billion yuan; the predicted value of operating costs in the fourth quarter was 30.38 billion yuan, and the actual value was 30.07 billion yuan.

The average error rate of operating costs is 3.8%, and the cloud computing platform has high prediction accuracy for operating costs.

(4) Forecast operating profit margin and return on equity

Figure 10a shows the company's actual and forecast operating profit margins for each quarter of 2021, while Figure 10b shows the actual and forecasted ROE for each quarter of 2021.

According to the forecast trend line of the company's economic indicators for each quarter in 2021 drawn by the cloud platform, the forecast value of operating profit rate and the forecast value of return on equity are calculated, and then compared with the actual value in 2021. As can be seen from Figure 10, the forecast value of the operating profit margin in the first quarter of 2021 is 4.39%, and the actual value is 4.53%; the forecast value of the operating profit margin in the second quarter is 4.78%, and the actual value is 5.2%; the third quarter operating profit margin forecast was 4.69%, the actual value was 4.78%; the fourth quarter operating profit margin forecast was 5.36%, the actual value was 5.43%. The average error rate of operating profit margin forecast is 10.3%, which is affected by the forecast error of operating income. Accordingly, the operating profit margin error is relatively significant. The predicted value of ROE in the first quarter of 2021 is 3.94%, the actual value is 3.97%; the predicted value of ROE in the second quarter is 8.58%, the actual value is 9.63%; the predicted value of ROE in the third quarter is 14.2%, the actual value is 13.2%; the fourth quarter ROE forecast value is 15.78%, the actual value is 15.84%. The prediction error of ROE is 1.5%, and the cloud computing platform has high prediction accuracy for ROE.

5. DISCUSSION

In terms of data fusion, the economic data of the enterprise is integrated through the cloud computing platform, covering the financial accounting data of the enterprise and other non-financial accounting data. In terms of intelligence and three-dimensionality, multi-angle and multi-dimensional data analysis tools are used to dynamically analyze the historical data of each period, so as to obtain a comprehensive view of the operational status of the enterprise. In terms of dynamism, it is an efficient means of pre-prediction, in-process monitoring, and post-event analysis of enterprise economic data, and provides real-time reports on financial data analysis and performance appraisal management for decision-making levels at all company levels. Also, it will display the results dynamically to meet the timely demand of enterprise managers for the company's business data analysis information. In terms of convenience, it combines data retrieval with document retrieval and uses technologies such as Baidu and Google. Enterprise managers and financial personnel can conduct a search, and at the same time, the result interface is displayed on the mobile phone for easy reference.

Although in the Internet cloud computing platform based on data fusion applied by Xingang Group, there are still large errors in the forecast values of operating income and operating profit margin, it can accurately predict a trend of rising operating income in the second quarter and a modest decline in the third quarter. In addition, the cloud computing platform has small prediction errors for operating costs and ROE, so although there are errors in the prediction of enterprise economic indicators by the cloud computing platform, it is relatively accurate and has a certain forward-looking outlook. At the same time, the application test of the financial comprehensive analysis function of Xingang Group has verified that the Internet cloud computing platform based on data fusion has significant advantages, which can increase the cost efficiency of Xingang Group operations, and improve its corporate strategy.

6. CONCLUSION

Cloud computing and data fusion have brought huge changes to the economic informatization of enterprises. The application of the Internet cloud computing analysis platform based on data fusion in the comprehensive prediction analysis module of Xingang Group verifies the research in the article. With the continuous emergence of new financial concepts and growing financial needs, it is necessary to continuously update the data informatization methods, thereby further improving the intelligent decision-making analysis of the Internet cloud computing platform, helping enterprises to develop rapidly and strengthen their core competitiveness.

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