Hindawi
Mobile Information Systems
Volume 2022, Article ID 6974246, 12 pages
https://doi.org/10.1155/2022/6974246

Research Article

Intelligent Financial Processing Based on Artificial Intelligence-Assisted Decision Support System

Xinyu Zhao [1] and Omer Saeed [2]

[1]School of Mathematics, Liaoning Normal University, Dalian, Liaoning 116029, China
[2]Institute of Management, Kyrgyz International Universal College, Bishkek, Kyrgyzstan

Correspondence should be addressed to Xinyu Zhao; zhaoxinyu161@163.com and Omer Saeed; omersaeed@mail.cu.edu.kg

Received 30 May 2022; Revised 9 July 2022; Accepted 19 July 2022; Published 8 August 2022

Academic Editor: Chi Lin

In order to improve the effect of intelligent financial processing and decision-making, this paper combines the artificial intelligence-assisted decision support system to construct an intelligent financial processing system. Based on the RBF neural network, this paper studies a fast decision-making algorithm based on short-term efficiency in an adaptive burst communication system. The trained RBF neural network can make quick decisions according to the parameters such as the electromagnetic environment information obtained by perception, and has good communication anti-interference ability, good fault tolerance ability and certain generalization ability. Moreover, this paper designs a channel-associated signaling transmission mechanism for adaptive burst communication system, and constructs an intelligent financial processing system based on artificial intelligence-assisted decision support system. The simulation results show that the intelligent decision-making model in this paper has a certain practical effect in the simulation.

1. Introduction

In the process of the continuous development of the globalization of the world economy, the market competition is becoming more and more fierce, and the use of modern science and technology can reasonably manage the company's operation and capital investment. However, the company operates with a relatively large amount of data. For finance, how to analyze the meaning of the data and solve the information association is the main consideration. Moreover, due to the development of computer technology, information processing technology has developed faster, and accounting models are used to deal with traditional complex financial problems. As the development of computer technology has promoted the development of information processing technology, traditional and complex financial problems can be solved by creating accounting models. At the same time, financial management in the new modern society has changed. The original accounting information base has certain limitations, and neither accounting nor financial analysis can meet the actual needs of managers. Artificial intelligence technology can solve this problem very well. Moreover, the traditional accounting-based accounting is developing towards the network, and the financial intelligent decision support system is analyzed, so as to realize the corresponding decision-making and management of the enterprise.

To solve these problems, the intelligence of the financial decision support system is an inevitable way. The deep learning and autonomous learning, natural language processing, data mining, and reasoning perception and other functions that artificial intelligence has developed up to now are the mechanisms and implementation paths of the financial decision support system. Perfection provides ideas. Smart finance can be traced back to the 1980s. Scholars at home and abroad have conducted a lot of research on the definition, characteristics and standards of intelligent finance, which enriches and promotes the theoretical development of intelligent finance management. In the era of big data, intelligent finance has developed rapidly, and the cloud-based financial robot has been released, making finance more focused on the company's strategic finance and business financial decision-making; UFIDA Cloud Finance uses global treasury, intelligent finance and real-time accounting. Combination as the core, supported by technologies such as artificial intelligence and financial sharing, provides targeted solutions for enterprise cost accounting, financial management and investment financing.

With the gradual increase in the application of big data in various fields of society, the advantages of intelligent finance are also reflected in the real-time interaction of information in the cloud with audit institutions, tax agencies, the China Securities Regulatory Commission and other third-party service agencies, making it more convenient and fast for enterprises. Financial work gives services and support. A large amount of data is generated in the business and operation of an enterprise every day, and what the enterprise needs to do is to analyze the data and use it after processing. For the development of the enterprise, financial personnel should actively improve their use of data analysis tools and analysis. The ability of data to form an efficient service team.

This paper combines the artificial intelligence assisted decision support system to construct an intelligent financial processing system to improve the effect of enterprise financial processing, which provides a theoretical reference for subsequent enterprise financial decision-making.

2. Related Work

Although the term "smart finance" has been born for a long time, the academic community has not given a clear and authoritative definition for it. According to the analysis of "smart finance" by academic researchers, it is usually defined as [1]: Intelligent finance is to carry out the company's financial management activities through the organic cooperation of man and machine, and gradually improve and develop until it can gradually replace some full-time financial personnel to carry out financial management behavior. In short, "smart finance" is a brand-new financial management method. It is based on the latest financial management theories and financial tools. It is a new model with significant advantages such as full-function and whole-process intelligent management [2]. Literature [3] pointed out that intelligent finance mainly takes finance as the core. In the traditional financial category, it is generally divided into two branches: finance and accounting. Among them, accounting is the management of bookkeeping, which converts unstructured information into data and provides accounting reports to external users; finance is financial management. The analyzed financial data information is provided to the internal management personnel of the enterprise, and then it is used in decision-making. With the development of Internet technology, the functions of finance and accounting in enterprises are becoming more and more blurred. The rapid development of enterprises has made it impossible to strictly distinguish between finance and accounting, and it is necessary to re-understand and define enterprise finance [4].

Literature [5] found that the reason why financial management adopts intelligent financial decision support system is that the enterprise has a high degree of business structure. And through the design and development of the intelligent decision support system, it plays an important role in promoting the development of financial management in a better direction [6]. Based on the analysis of the nature of decision-making, it is mainly composed of three types: ① semi-structured decision-making; ② structured decision-making; ③ unstructured decision-making. Intelligent financial management mainly solves semi-structured decision-making and unstructured decision-making problems [7]. Literature [8] believes that intelligent finance includes three branches: first, the intelligent management accounting platform based on business intelligence, which occupies a core position in the field of intelligent finance; The basic department of finance; third, the intelligent financial platform based on artificial intelligence, which represents the in-depth development of intelligent finance, but this expression lacks the internal logical relationship between the three levels. Literature [9] pointed out that the construction of enterprise intelligent finance is analyzed from two aspects of enterprise data and business process. One is to decompose the business process, integrate the activity process that can create value, deeply realize the integration of business and finance, and then improve its intelligent process. The second is the construction of a big data management system, to achieve the full integration of financial data and business data, and to enhance the data management and analysis capabilities of enterprise value creation activities.

The rapid development of economic globalization and big data has made intelligent financial applications mature, and in this development process, the development trend of intelligent finance has emerged. In addition to the general influence of laws and regulations related to smart finance, the needs of enterprises themselves, the development of new science and technology, and the speed of research and development of smart financial systems will have a great impact on the future development trend of smart finance [10]. Reference [11] pointed out that under the background of the vigorous development of financial cloud and big data, the financial information system of enterprises does not need to be purchased outright, nor does it need to arrange a large number of personnel for system maintenance, but directly rent the financial information of software manufacturers service can be. The benefits brought by this streamlined approach to enterprises are also obvious: first, it can reduce the hardware investment and operation and maintenance investment required by enterprises to build information systems, and turn to software service providers to provide professional operation and maintenance and services in the cloud; second It enables all the financial cloud services used by enterprises to be the latest version, and there is no need to spend time and extra money to update and upgrade [12]. With the gradual increase in the application of big data in various fields of society, the advantages of intelligent finance are also reflected in the real-time interaction of information in the cloud with audit institutions, tax agencies, the China Securities Regulatory Commission and other third-party service agencies, making it more convenient and fast for enterprises. Financial work gives services and support. A large amount of data is generated in the business and operation of an enterprise every day, and what the enterprise needs to do is to analyze the data and use it after processing. For the development of the enterprise, financial personnel should actively improve their use of data analysis tools and analysis. The ability of data to form an efficient service team [13]. Reference [14] pointed out that financial outsourcing business will be affected by intelligent finance. The development of intelligent finance has led to an increase in outsourcing business. Many small and medium-sized companies do not have the ability to conduct independent accounting. Therefore, outsourcing financial work to firms such as firms can effectively reduce costs [15]; for large and medium-sized enterprises, financial sharing the development of services can also bring convenience to them. The main operation steps are as follows: First, write a smart contract through the blockchain, and the other party, as Party *B*, accepts the work tasks issued by Party *A*, and at the same time completes the work according to the specific terms of the contract, and Party *A* according to the workload To pay the salary, it should be noted that Party *A* should determine the work quality assesment specifications in the blockchain in advance, and the accounts of both parties need to be clearly registered. When Party B achieves the work goals on time and passes the assessment requirements, the pre-filled smart contract will be signed. Transfer the salary to Party *B*'s account [16]. In the blockchain, the secret code of the smart contract is compiled according to the code of the computer, and the entire transaction is not controlled by human beings, but is completed automatically by the computer, which can protect the interests of both parties [17]. Reference [18] pointed out that the application scope of financial intelligence will continue to expand in the future, and intelligent robots can replace financial personnel to complete simple and repetitive financial tasks, such as bookkeeping, account reconciliation and reimbursement work. At the same time, the blockchain system can directly connect with the uploaded account book. Although financial personnel can record and backup in the system, they cannot modify the account book privately. In addition, blockchain can also ensure the smooth signing of smart contracts. The signing time is set in advance in the system, and then the system will strictly abide by the agreed time to realize the orderly development of the signing work [19].

3. Intelligence-Assisted Decision-Making Algorithm

The decision-making mechanism of the burst communication system is shown in Figure 1, and the main functions are as follows:

(1) It obtains the working electromagnetic environment information (channel quality, interference characteristics, etc.) of the burst communication system through spectrum resource sensing. According to the information in the knowledge base (spectrum allocation, platform capabilities, regulatory policies, interference characteristics, etc.), this information is mapped to system state parameters;

(2) Based on the results of policy decision-making and spectrum resource perception and identification, it adopts a policy-based decision-making algorithm to make decisions on the system parameter configuration under the support of the policy library, and adjusts the parameter configuration according to the transmission performance information fed back;

(3) It makes quick decisions based on short-term performance, adopts neural network algorithm, and trains the neural network under the database constructed by historical transmission performance. Moreover, it uses the results of spectrum resource perception and recognition as the input of the neural network to make quick decisions, and can quickly obtain effective system parameter configuration;

(4) It evaluates the generated anti-jamming strategy according to the feedback performance results, and updates the database for the strategy that meets the anti-jamming requirements of the burst communication system.

The input of the decision mechanism is: interference type, interference parameters, link quality and performance evaluation parameters. Link quality and transmission performance evaluation parameters include transmit power, estimated Signal-to-Noise Ratio (SNR) value, synchronization detection correlation value, bit error rate, waveform efficiency, and recognition rate. The output is: transmit power, interference processing method and frequency selection, etc.

The block diagram of the decision engine in this paper is shown in Figure 2. When the perceptron receives external information (interference type, interference parameters, link quality, etc.), with the support of the database, the fast decision-making unit based on short-term efficiency is preferentially used for decision-making, and the parameters are configured after the decision-making result is obtained. After the performance feedback is obtained, if the feedback result does not meet the performance requirement, the policy-based decision-making is used as the correction unit to make a new decision until the feedback result meets the performance requirement. The results of this decision are stored in the database in the form of cases, and the database is continuously enriched to continuously improve the learning ability of the system.

The short-term performance-based fast decision unit employs a neural network algorithm (NN) algorithm, which is used to make fast and optimal decisions. The neural network can be trained in advance, extract the required knowledge, and use it directly when a decision is needed, which greatly reduces the decision-making time.

The decision correction unit adopts the Policy-Based Decision (PBD) algorithm to provide backup support in the case of failure of search decision and fast decision. Although the process is slow, it has a feedback mechanism, which can

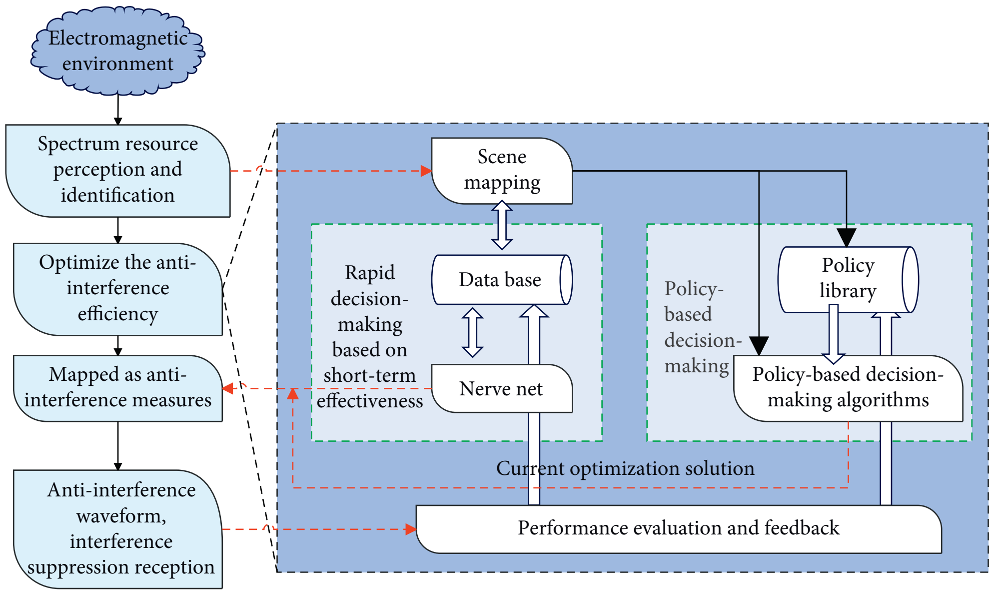

Figure 1: Working principle of the decision-making mechanism of the burst communication system.

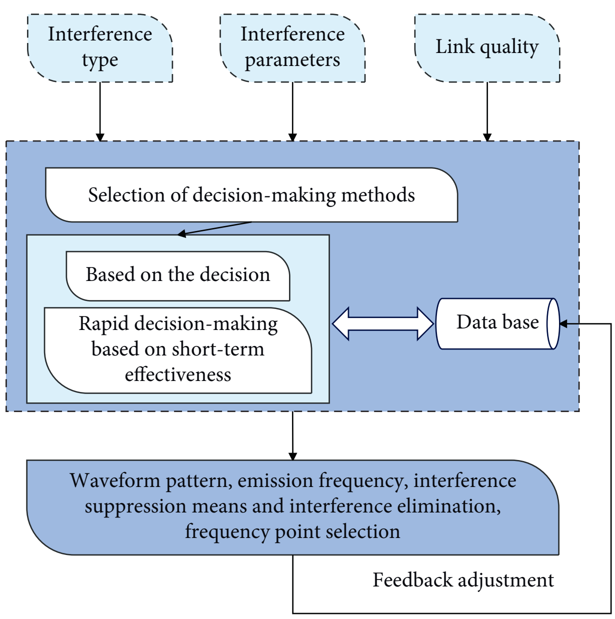

Figure 2: Decision engine block diagram.

monitor the system performance in real time, interact with the environment in an unknown environment, and decide the optimal parameter configuration in the current environment.

According to the goal of realizing the communication with the largest recognition rate with the minimum power consumption and the complexity of the interference suppression and elimination means, the anti-interference performance index and objective function are designed based on parameters such as transmit power, bit error rate, complexity of interference suppression and elimination methods, and recognition rate. Since the dimensions and variation ranges of different indicators are different, all indicators are first de-dimensioned and normalized.

(1) Normalization of minimizing bit error rate.

The bit error rate (BER) is the ratio of the number of bits in a digital signal received in error over a period of time to the total number of bits in the digital signal received at the same time. The de-dimensionalized normalized value of the average bit error rate during the inquiry and response process is shown in the following formula:

$$f_b = \frac{\log_{10} P_{b_{\max}} - \log_{10} P_b}{\log_{10} P_{b_{\max}} - \log_{10} P_{b_{\min}}}. \tag{1}$$

Among them, f_b represents the normalization parameter that minimizes the average bit error rate of the query and response, the average bit error rate of the query and response is $P_b = P_{b1} + P_{b2}, P_{b1}$ and P_{b2} represent the bit error rate of the query and response process, respectively. When the synchronization of the inquiry process is unsuccessful, $P_{b1} = 0.5$, and when the synchronization of the response process is unsuccessful, $P_{b2} = 0.5$. We define $P_{b_{\max}} = 0.5, P_{b_{\min}} = 10^{-7}$.

(2) Normalization of minimizing transmit power

The de-dimension normalization of the transmit power P at the transmitter is as follows:

$$f_P = \frac{\log_{10} P_{\max} - \log_{10} P}{\log_{10} P_{\max} - \log_{10} P_{\min}}. \tag{2}$$

Among them, $P_{\max} = 2200\text{W}, P_{\min} = 1800\text{W}, f_P$ is the normalized value to minimize the transmit power.

(3) Minimize the complexity of interference processing means

C is the complexity of the interference processing means, which is calculated according to the complexity of the interference suppression and interference cancellation algorithms. The de-dimensionalized normalization of the complexity of the interference suppression and cancellation means is shown in the following formula:

$$f_C = \frac{C_{\max} - C}{C_{\max} - C_{\min}}. \quad (3)$$

(4) Maximize the average transmission accuracy.

The average transmission accuracy rate is an indicator to measure the recognition rate. The transmission accuracy rate is the average value of the transmission accuracy rate in the query process and the transmission accuracy rate in the response process. The de-dimension normalization process is shown in formula (4).

$$f_R = \frac{R^2 - R_{\min^2}}{R_{\max^2} - R_{\min^2}}. \quad (4)$$

Among them, R is the average transmission accuracy rate $R_{\min} = 0, R_{\max} = 1$.

The goal of this system is to achieve the communication with the largest recognition rate with the smallest power consumption and the smallest complexity of the interference processing means. Therefore, the objective function needs to comprehensively consider the transmission performance, the transmission power and the complexity of the anti-interference means.

(1) Simulation objective function.

In this paper, the simulation objective function is used as the short-term performance. The bit error rate of the communication system can be obtained during the simulation, and the transmission performance is represented by the bit error rate and the average transmission accuracy rate. At the same time, considering the transmit power and the complexity of the anti-jamming method, the design objective function is as follows:

$$E_o = w_b\overline{f_b} + w_R\overline{f_R} + w_P\overline{f_P} + w_C\overline{f_C}. \quad (5)$$

Among them, $\overline{f_b} + \overline{f_R} + \overline{f_P} + \overline{f_C}$ represents the de-dimensioned normalized value of the bit error rate of the query process, the average bit error rate of the response, the average transmission accuracy rate, the transmit power, and the complexity of the interference processing method, respectively. $w_b + w_R + w_P + w_C$ are the weight values of $\overline{f_b} + \overline{f_R} + \overline{f_P} + \overline{f_C}$, respectively.

(2) Decision objective function.

In the case of fast decision-making, since the bit error rate cannot be obtained, only the average transmission accuracy rate $\overline{f_R}$ is used to represent the transmission performance. The objective function is as follows:

$$E_f = w_R\overline{f_R} + w_P\overline{f_P} + w_C\overline{f_C}. \quad (6)$$

The block diagram of the fast decision-making algorithm based on short-term performance using neural network is shown in Figure 3. The decision algorithm mainly includes offline process and online process. In the offline process, the network model is established through the model parameters of the neural network, and the neural network is trained based on the data in the database until the network training reaches the standard. The neural network at this time can be directly used for real-time decision-making in the online process. First, the perceptron receives external information (interference type, interference parameters, link quality). Then, the external information is preprocessed to make it suitable for the neural network model designed in this paper, and then the processed information parameters are input into the neural network. The final decision outputs the optimized parameters in the current environment, including: selection of interference suppression and elimination methods, transmission power, etc. According to the feedback transmission performance, it is judged whether the decision parameters meet the current requirements, and the database is adjusted to enrich the content of the database.

RBF neural network is a fixed neural network with only 3 layers, including an input layer, a hidden layer and an output layer. Because the hidden layer unit of this kind of neural network uses radial basis function for calculation, it is called radial basis function neural network. The structure of the RBF neural network is shown in Figure 4:

The number of neurons in the input layer of the RBF neural network is the same as the dimension of the input vector, and the input layer is directly connected to the hidden layer. The input layer sends the input vector to the hidden layer, and the hidden layer uses the radial basis function to perform nonlinear processing on the input vector. The number of neurons in the hidden layer needs to be reasonably set according to the problem to be solved. In addition, the output layer performs weighted summation of the results of each neuron output in the hidden layer as the result of the network output layer, and the number of neurons in the output layer is determined by the dimension of the output vector. Since the number of neurons in the input layer and output layer of the RBF neural network is determined by the input and output vectors of the problem to be solved, the network size of the RBF neural network under a specific problem depends on the number of neurons in the hidden layer.

The hidden layer usually uses the Gaussian function as the radial basis function. For the input vector of dimension I: $\mathbf{x} = [x_1, x_2, \ldots, x_I]$, the output h_i of the ith neuron in the corresponding hidden layer is shown in formula (7):

$$h_i = \varphi_i(\mathbf{x} - \mathbf{c}_i) = \exp\left(-\frac{\|\mathbf{x} - \mathbf{c}_i\|^2}{2\sigma_i^2}\right). \quad (7)$$

Among them, $\mathbf{c}_i$ is the center of the basis function of the i-th neuron in the hidden layer, and σ_i is the width of the basis function of the i-th neuron. The output of the output

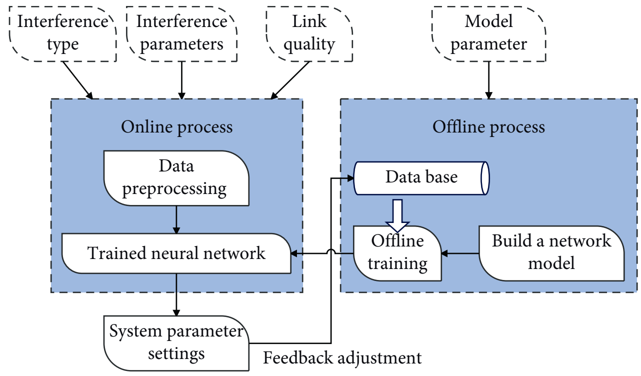

FIGURE 3: Block diagram of fast decision-making algorithm based on short-term performance using neural network.

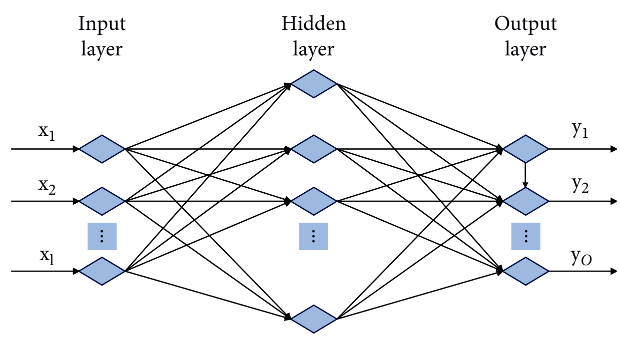

FIGURE 4: RBF neural network structure.

layer is the weighted sum of the outputs of each neuron in the hidden layer, that is, the expression of the output y_j of the j th neuron in the output layer is shown in formula (8):

$$y_j = \sum_i w_{ij} \exp\left(-\frac{\left\| \mathbf{x} - \mathbf{c}_i \right\|^2}{2\sigma_i^2} \right). \quad (8)$$

Among them, w_{ij} is the weight value of the i-th neuron in the hidden layer connecting the j-th neuron in the output layer.

It can be seen that the center of the basis function in the hidden layer and the weight value from the hidden layer to the output layer are two important parameters that need to be solved in the RBF neural network. In the RBF neural network algorithm, the K-means clustering algorithm is usually used to solve the base function center of the hidden layer, and the least squares method is usually used to solve the weight value connecting the hidden layer to the input layer.

The K-means clustering algorithm is a typical algorithm based on distance clustering. The main idea of the algorithm is to classify the sample points in the sample into the category of the nearest mean. The steps of the K-means clustering algorithm are as follows:

(1) The algorithm selects the initial K sample points as the initial cluster center $[\mathbf{c}_1(0), \mathbf{c}_2(0), \ldots, \mathbf{c}_K(0)]$;

(2) The algorithm calculates the Euclidean distance between each sample point in the sample and the cluster center;

(3) For each sample point, the algorithm selects the nearest cluster center point as the cluster center of the sample point to form K domains;

(4) The algorithm calculates the mean of all sample points in each domain as the new cluster center in the domain, replaces the old cluster center with the new cluster center and updates the cluster center $[\mathbf{c}_1(1), \mathbf{c}_2(1), \ldots, \mathbf{c}_K(1)]$. The algorithm repeats (2)–(4) until the cluster centers obtained twice before and after are the same, and then stop training;

(5) The algorithm takes the cluster center obtained by the last iteration as the basis function center $[\mathbf{c}_1, \mathbf{c}_2, \ldots, \mathbf{c}_K]$ of each neuron in the hidden layer.

After the basis function center $[\mathbf{c}_1, \mathbf{c}_2, \ldots, \mathbf{c}_K]$ of each neuron is obtained, the width of the basis function corresponding to each neuron can be calculated. The width of each basis function in the RBF neural network is the same, and the determination method is shown in formula (9):

$$\sigma_i = \frac{c_m}{\sqrt{2N}} \quad (i = 1, 2, \ldots, H). \quad (9)$$

Among them, c_m is the maximum Euclidean distance between the centers of each basis function, N is the number of input training samples, and H is the number of neurons in the hidden layer.

According to formula (8), it can be seen that the calculation of neurons in the output layer is a linear summation, and the weight value matrix $\mathbf{W}$ shown in formula (10) can be solved by the least square method:

$$\mathbf{W} = \begin{pmatrix} w_{11} & \cdots & w_{1O} \\ \vdots & \ddots & \vdots \\ w_{H1} & \cdots & w_{HO} \end{pmatrix}. \quad (10)$$

The core idea of the least squares method for solving weights is to minimize the l_2 norm of the residual between the actual output $\{\mathbf{y}^{(i)}\}_{i=1}^{N}$ and the expected output $\{\mathbf{a}^{(i)}\}_{i=1}^{N}$ of the network through learning. The weight at this time can be used as the weight from the hidden layer to the output layer of the network. The residual between the actual output and the expected output of the network is shown in formula (11):

$$\text{error}_i = \mathbf{y}^{(i)} - \mathbf{a}^{(i)} \quad ,i = 1, 2 \ldots, N. \quad (11)$$

One half of the l_2-norm is shown in formula (12):

$$\begin{aligned} J(\mathbf{W}) &= \frac{1}{2}\sum_{i=1}^{N}\left(\mathbf{y}^{(i)} - \mathbf{a}^{(i)}\right)^2 \\ &= \frac{1}{2}\sum_{i=1}^{N}\left(\mathbf{W}^T\mathbf{h}^{(i)} - \mathbf{a}^{(i)}\right)^2 \quad ,i = 1, 2 \ldots, N. \end{aligned} \quad (12)$$

Among them, $\mathbf{h}^{(i)}$ is the output $\mathbf{h}^{(i)} = [h_1^{(i)}, h_2^{(i)}, \ldots, h_H^{(i)}]^T$ of the hidden layer corresponding to the i-th training sample $\mathbf{x}^{(i)} = [x_1^{(i)}, x_2^{(i)}, \ldots, x_I^{(i)}]^T$. The input sample matrix is $\mathbf{X} = [\mathbf{x}^{(1)}, \mathbf{x}^{(2)}, \ldots, \mathbf{x}^{(N)}]^T$, the output sample matrix is $\mathbf{Y} = [\mathbf{y}^{(1)}, \mathbf{y}^{(2)}, \ldots, \mathbf{y}^{(N)}]^T$, the hidden layer output matrix is $\mathbf{H} = [\mathbf{h}^{(1)}, \mathbf{h}^{(2)}, \ldots, \mathbf{h}^{(N)}]^T$, and the expected output matrix is $\mathbf{A} = [\mathbf{a}^{(1)}, \mathbf{a}^{(2)}, \ldots, \mathbf{a}^{(N)}]^T$. The formula (12) can be written in the form of formula (13):

$$\begin{aligned} J(\mathbf{W}) &= \frac{1}{2} + \mathbf{Y} - \mathbf{A}+_2^2 \\ &= \frac{1}{2} + \mathbf{HW} - \mathbf{A}+_2^2 \\ &= \sum_{i=1}^{H}\frac{1}{2}\left\|\mathbf{Hw}_i - \mathbf{a}_i\right\|_2^2. \end{aligned} \quad (13)$$

Among them, the column vector $\mathbf{w}_i$ is the i-th column of the matrix $\mathbf{W}$, and the column vector $\mathbf{w}_i = \left\{w_i^{(j)}\right\}_{j=1}^{N}$ is the i-th column of the matrix A. The weight matrix $\widehat{\mathbf{W}}$ obtained based on the least squares method is shown in formula (14):

$$\widehat{\mathbf{W}} = \text{argmin}_{\mathbf{w}}\ J(\mathbf{W}). \quad (14)$$

The least squares solution $\mathbf{w}_i = \mathbf{H}^{+}\mathbf{a}_i$ of the equation system $\mathbf{Hww}_i = \mathbf{a}_i$ can make the value of $\|\mathbf{Hw}_i - \mathbf{a}_i\|_2^2$ the smallest, so the weight matrix $\widehat{\mathbf{W}}$ obtained from the solution is shown in formula (15):

$$\widehat{\mathbf{W}} = \mathbf{H}^{+}\mathbf{A}. \quad (15)$$

When the inverse of $\mathbf{H}^T\mathbf{H}$ exists, $\mathbf{H}^{+}$ can be written in the form of formula (16):

$$\mathbf{H}^{+} = \left(\mathbf{H}^T\mathbf{H}\right)^{-1}\mathbf{H}^T. \quad (16)$$

For the RBF neural network algorithm, the parameter that has a greater impact on the decision-making performance is the network size. The number of neurons in the input layer and output layer of the RBF neural network depends on the dimensions of the input and output sample vectors. The mapping method between neurons and output parameters in the output layer can be mapping method 1: one neuron represents one parameter. It can also refer to the idea of one-hot coding and adopt mapping method 2: a neuron represents a possible value of a parameter. The M input parameters are $p_i\,(i = 1, \ldots, M)$, and the parameter $p_i\,(i = 1, \ldots, M)$ has m_i possible values $[p_i(1), p_i(2), \ldots, p_i(m_i)]$, and the specific mapping methods are shown in Figures 5 and 6 respectively.

In the mapping method 1, the output result of the neural network is continuous, while the value of each parameter in this model is discrete. Therefore, the value within the parameter value range $[p_i(1), p_i(2), \ldots, p_i(m_i)]$ that is closest to the actual output value of the neuron corresponding to the parameter $p_i\,(i = 1, \ldots, M)$ is taken as the value of the output parameter p_1. For example, the value range of parameter p_1 is [0, 1, 2, 3]. If the neuron output is 0.8, the value of the output parameter p_1 is 1.

In the mapping method 2 shown in Figure 6 , the neurons in the output layer are divided into M groups according to the output parameters, and the number of neurons in the i-th group and the number of possible values of the parameter p_i are m_i. According to the output value of each neuron in the group, the value of the neuron with the largest output value is set to 1, and the output value of the rest of the neurons in the group is set to zero. The parameter value corresponding to the neuron set to 1 is taken as the value of parameter p_i. For example, the value range of parameter p_1 is [0, 1, 2, 3], which means that the number of neurons in parameter p_1 is 4. If the output is [0.01, 0.07, 0.9, 0.2], the value of parameter p_1 is 2.

The input parameters of the RBF neural network in this paper are: interference type, interference feature and interference power, so the number of neurons in the input layer is 3. The output parameters are signal transmission power and interference processing mode, and there are 15 cases for the value of power. There are three types of interference processing methods: processing or not, interference suppression and interference cancellation. Therefore, if the output layer mapping method 1 is used, the number of neurons in the output layer is 2. If the output

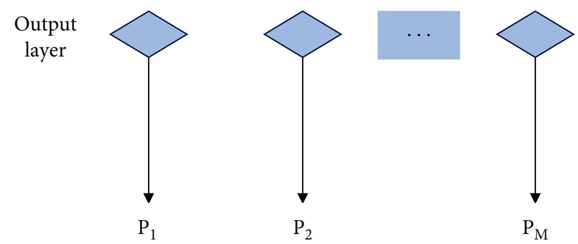

FIGURE 5: Output layer mapping method 1.

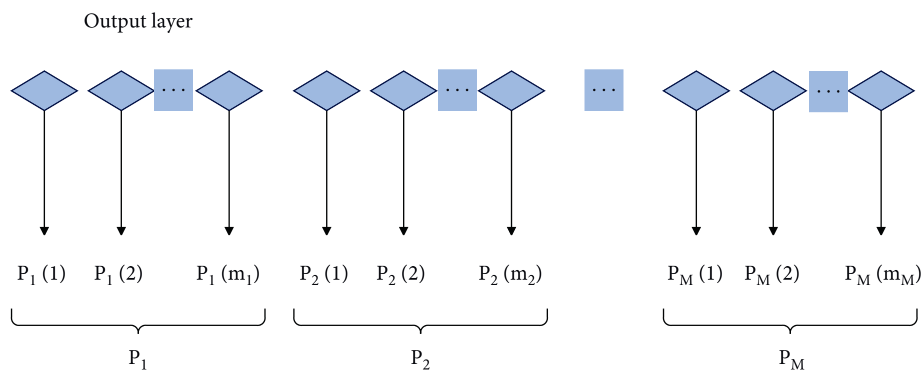

FIGURE 6: Output layer mapping method 2.

layer mapping method 2 is used, the number of neurons in the output layer is 18. The number of neurons in the hidden layer determines the complexity of the RBF neural network. The larger the number of neurons, the better the fitting of the input sample, and the easier it is to over-fit. The smaller the number of neurons, the lower the fit to the input sample, and the less likely to over-fit. Different numbers of neurons in the hidden layer are set to simulate the output error and correct rate of the network using output layer mapping method 1 and output layer mapping method 2 respectively. The results are shown in Figure 7.

As can be seen from Figure 7, when the number of neurons in the hidden layer is the same, the mean square error and correct rate performance of the training set and the test set under the output layer mapping method 2 can usually be significantly better than the mean square error and correct rate performance of the training set and the test set under the output layer mapping method 1, respectively. When the output layer mapping method 2 is adopted and the number of hidden layer neurons is set to be greater than or equal to 41, the correct rate of the training set and the test set converges to 1. When the output layer mapping method 1 is used and the number of hidden layer neurons is set to 45, the correct rate of the training set and the test set is close to 1. When the number of neurons in the hidden layer is greater than 54, the correct rate of training set and test set converges to 1. To sum up, the network under the output mapping mode 2 is better, and when the number of hidden layer neurons in this mapping mode is 50, the correct rate of the training set and the test set is 1 and the mean square error is small. Therefore, the network output mapping method 2 is selected, and the number of hidden layer neurons is 50.

4. Intelligent Financial Processing Based on Artificial Intelligence-Assisted Decision Support System

In a broad sense, the intelligent financial system has an impact on the development of intelligent finance at the level of the environment, including various information and data resources, information industry, information talents, high-tech technology and informatization-related policies. It can be roughly divided into government departments, industry organizations, application entities and the supply chain of intelligent finance development. Although the process of intellectualization is mainly driven by the internal development power of the application subject, the external environment undoubtedly plays a crucial role in promoting it. The structure of the generalized intelligent financial system is shown in Figure 8.

The intelligent financial decision support system adopts a system structure consisting of four levels, which

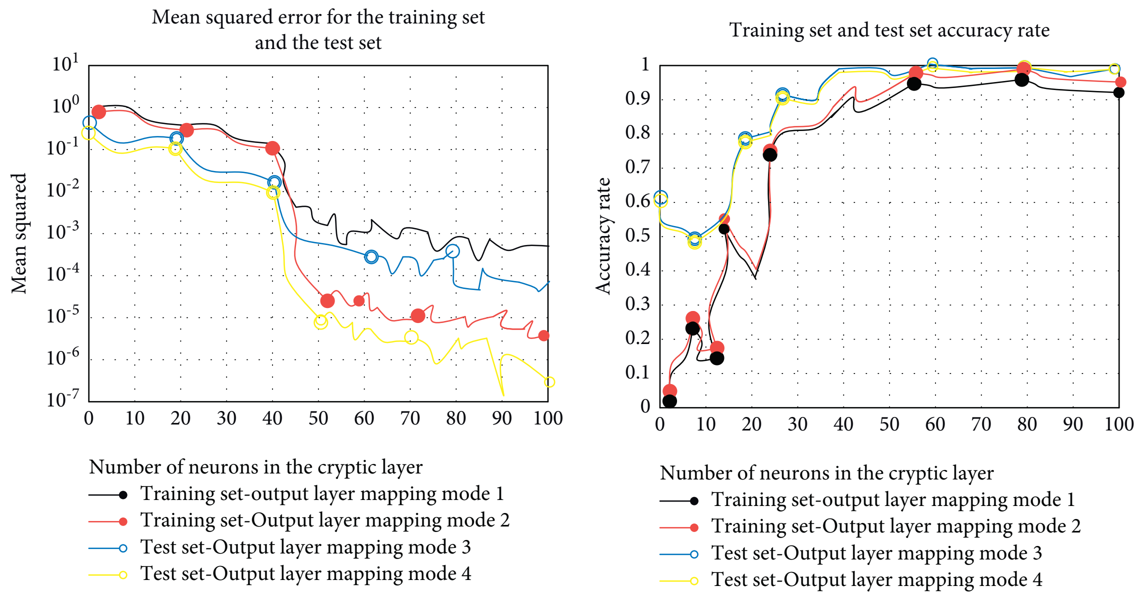

Figure 7: Performance of different output layer mapping methods and different numbers of neurons in the hidden layer.

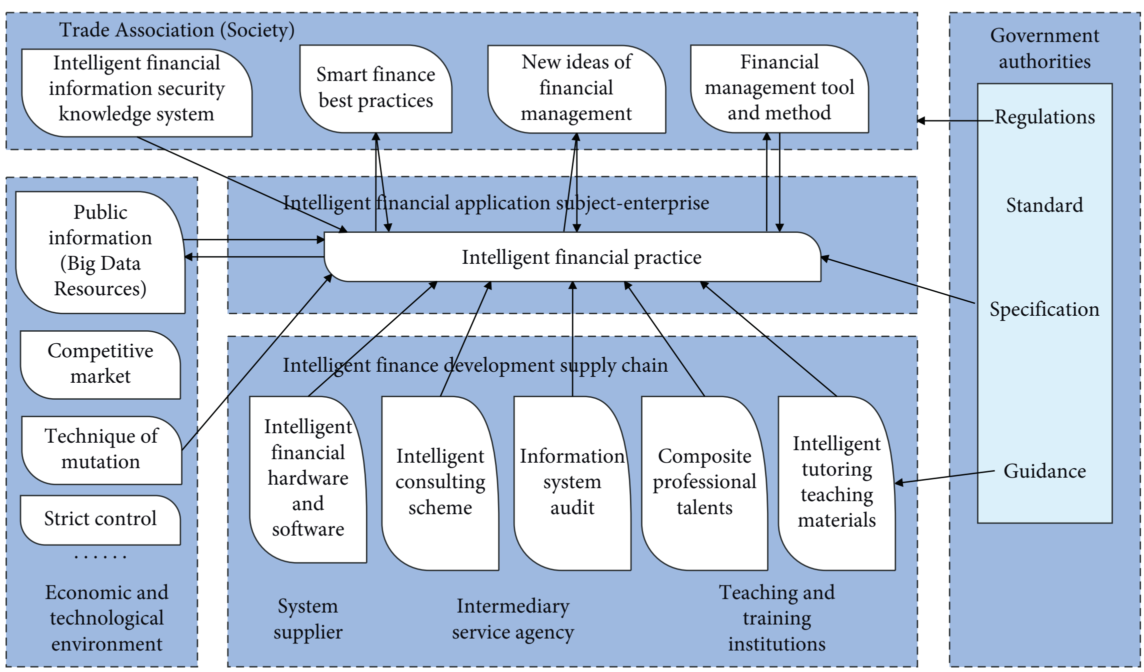

Figure 8: Architecture diagram of intelligent financial system.

can ensure the scalability and scalability of the system, and any level can be independently extended and developed according to actual needs. The system structure diagram is shown in Figure 9.

Figure 10 shows the regression simulation image of intelligent financial processing based on artificial intelligence-assisted decision support. Through the expert evaluation of the group data (Table 1), the simulation

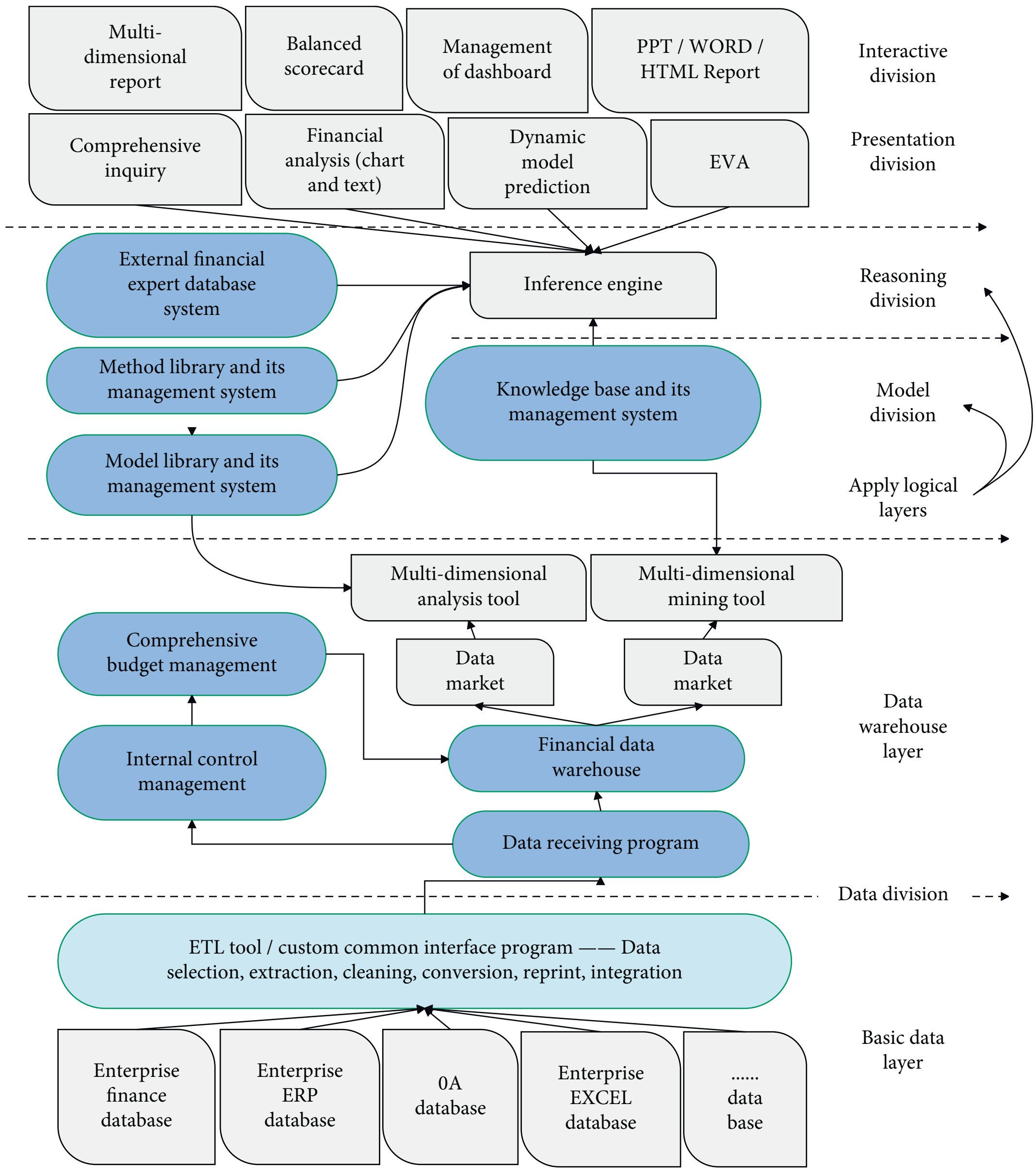

Figure 9: System structure diagram.

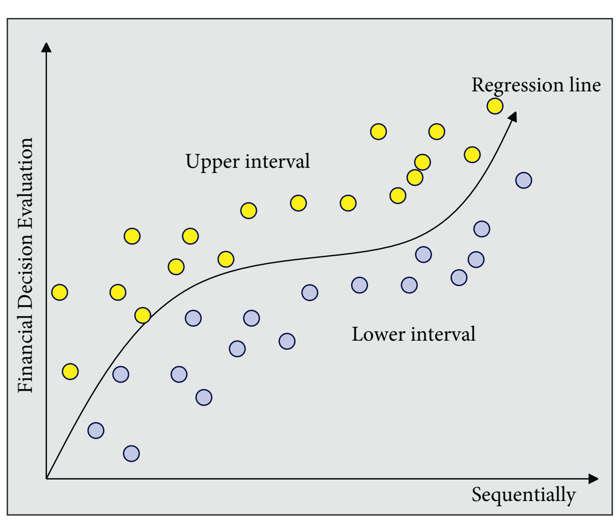

Figure 10: Regression simulation image of intelligent financial processing based on intelligence-assisted decision support.

Table 1: Evaluation of system effect.

Number	System assessment	Number	System assessment	Number	System assessment
1	86.89	16	84.59	31	81.51
2	84.45	17	80.47	32	85.22
3	87.58	18	87.75	33	78.64
4	85.97	19	83.16	34	80.36
5	84.52	20	84.30	35	90.70
6	78.53	21	79.68	36	85.74
7	83.28	22	86.07	37	85.48
8	79.94	23	87.58	38	82.98
9	87.05	24	81.99	39	82.34
10	87.31	25	87.08	40	78.37
11	85.61	26	85.41	41	84.79
12	86.58	27	85.89	42	81.84
13	89.41	28	79.57	43	87.49
14	80.78	29	89.53	44	90.36
15	87.35	30	83.21	45	86.17

results show that the intelligent decision-making model in this paper has a certain practical effect in the simulation.

5. Conclusion

Financial decision-making is an important field of management accounting, and the correctness, timeliness and effectiveness of financial decision-making are related to the future development of an enterprise. With the development of computer and Internet technology, in order to improve the efficiency and accuracy of decision-making and provide necessary assistance for decision-makers, financial decision-making support systems have emerged and continuously developed and improved. However, the current financial decision support system still has many defects in data acquisition and unstructured problem solving, mainly exerting the functions of database and calculator. Moreover, it cannot automatically screen information that may be relevant to financial decision-making or provide differentiated and targeted decision-making recommendations, so it cannot fully meet the needs of managers. This paper combines the artificial intelligence-assisted decision support system to construct the intelligent financial processing system. The simulation results show that the intelligent decision-making model in this paper has a certain practical effect in the simulation.

Data Availability

The experimental data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The author declared that there are no conflicts of interest regarding this work.

Acknowledgments

This study did not receive any funding in any form.

References

[1] Z. Lanlan, A. Ahmi, and O. M. J. Popoola, "Perceived ease of use, perceived usefulness and the usage of computerized accounting systems: a performance of micro and small enterprises (mses) in China," *International Journal of Recent Technology and Engineering*, vol. 8, no. 2, pp. 324–331, 2019.

[2] A. Omitogun and K. Al-Adeem, "Auditors' perceptions of and competencies in big data and data analytics: an empirical investigation," *International Journal of Computer Auditing*, vol. 1, no. 1, pp. 92–113, 2019.

[3] K. S. Kumar, "Factors affecting the adoption of computerized accounting system (CAS) among smes in Jaffna District," *SAARJ Journal on Banking & Insurance Research*, vol. 8, no. 6, pp. 11–15, 2019.

[4] B. L. Handoko, A. N. Mulyawan, J. Tanuwijaya, and F. Tanciady, "Big data in auditing for the future of data driven fraud detection," *International Journal of Innovative Technology and Exploring Engineering*, vol. 9, no. 3, pp. 2902–2907, 2020.

[5] Z. Rezaee, A. Dorestani, and S. Aliabadi, "Application of time series analyses in big data: practical, research, and education implications," *Journal of Emerging Technologies in Accounting*, vol. 15, no. 1, pp. 183–197, 2018.

[6] E. Huerta and S. Jensen, "An accounting information systems perspective on data analytics and Big Data," *Journal of Information Systems*, vol. 31, no. 3, pp. 101–114, 2017.

[7] S. Balne, "Analysis on research methods in bigdata applications," *International Journal of Innovative Research in Computer and Communication Engineering*, vol. 8, no. 10, pp. 4059–4063, 2020.

[8] D. Chessell and O. Neguriţă, "Smart industrial value creation, cyber-physical production networks, and real-time big data analytics in sustainable Internet of Things-based manufacturing systems," *Journal of Self-Governance and Management Economics*, vol. 8, no. 4, pp. 49–58, 2020.

[9] B. Abdualgalil and S. Abraham, "Efficient machine learning algorithms for knowledge discovery in big data: a literature review," *Database*, vol. 29, no. 5, pp. 3880–3889, 2020.

[10] O. Throne and G. Lăzăroiu, "Internet of Things-enabled sustainability, industrial big data analytics, and deep learning-assisted smart process planning in cyber-physical manufacturing systems," *Economics, Management, and Financial Markets*, vol. 15, no. 4, pp. 49–58, 2020.

[11] E. Nica, C. I. Stan, A. G. Luţan, and R. □. Oa, "Internet of things-based real-time production logistics, sustainable industrial value creation, and artificial intelligence-driven big data analytics in cyber-physical smart manufacturing systems," *Economics, Management, and Financial Markets*, vol. 16, no. 1, pp. 52–63, 2021.

[12] D. B. L. Shallal Almutairi, "Impact of COVID19 on accounting profession from the perspective of a sample of head of accounting departments within KUWAITI manufacturing sector," *Psychology and Education Journal*, vol. 58, no. 2, pp. 4758–4768, 2021.

[13] V. Q. Thong, "Factors defining the effectiveness of integrated accounting information system in ERP environment–Evidence from Vietnam's enterprises," *ECONOMICS AND BUSINESS ADMINISTRATION*, vol. 7, no. 2, pp. 96–110, 2020.

[14] J. R. A. Q. Al Natour, "The impact of information technology on the quality of accounting information (SFAC NO 8, 2010)," *Turkish Journal of Computer and Mathematics Education (TURCOMAT)*, vol. 12, no. 13, pp. 885–903, 2021.

[15] A. P. Aaron, M. L. Kohlstrand, L. V. Welborn, and S. T. Curvey, "Maintaining medical record confidentiality and client privacy in the era of big data: ethical and legal responsibilities," *Journal of the American Veterinary Medical Association*, vol. 255, no. 3, pp. 282–288, 2019.

[16] B. J. Ali and M. S. Oudat, "Accounting information system And financial sustainability of commercial and islamic banks: a review of the literature," *Journal of Management Information and Decision Sciences*, vol. 24, no. 5, pp. 1–17, 2021.

[17] V. Brock and H. U. Khan, "Big data analytics: does organizational factor matters impact technology acceptance?" *Journal of Big Data*, vol. 4, no. 1, pp. 21–28, 2017.

[18] S. Antony Sibi and S. Antony Lucia Merin, "An investigation on accounting information system, Zambia," *Shanlax International Journal of Management*, vol. 8, no. 2, pp. 13–20, 2020.

[19] L. Loku, B. Fetaji, and A. Krsteski, "Automated medical data analyses of diseases using big data," *Knowledge International Journal*, vol. 28, no. 5, pp. 1719–1724, 2018.