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Research Article

Financial Big Data Based on Internet of Things and Wireless Network Communication

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With the advent of the era of big data, Internet of things technology and wireless communication technology have been in a state of rapid development. Opportunities and challenges in all walks of life are being subverted. Financial management, as the foundation of corporate governance, is important for improving economic efficiency and achieving sustainable business development which plays an important role. In order to realize the management and classification of financial big data, better identify the financial data of different enterprises, strengthen the safe storage of financial information, and provide early warning for the security issues involved, this article is based on the Internet of things and wireless communication networks. In the method part, this article introduces the framework of the Internet of things, Bluetooth, and infrared data transmission in wireless network communication and the principles of financial big data. The algorithm introduces a single-user MIMO system, free space propagation, and spectrum and energy efficiency. The analysis part analyzes the spectrum efficiency of different algorithms, social utility, average number of retransmissions, comprehensive scores of competitiveness in various fields of the Internet of things, and the significance of financial indicators. By comparing the data, it can be seen that the algorithm in this paper is superior to the two algorithms of IAN-CoMP and IA-CoMP. When the number of users is 100, the social utility of the algorithm in this paper is 4.45, while IAN-CoMP is 3.43 and IA-CoMP is 3.67. When the number of users increases to 700, the social utility of the algorithm in this paper is 28.34. The other two algorithms are, respectively, 24.45 and 25.99, and we know that the social utility of the algorithm in this paper is the best. Through comprehensive analysis, it is concluded that the financial big data model based on the Internet of things and wireless network communication in this paper can better realize data management and collection, so as to meet the needs of information developers.

1. Introduction

In the era of big data, the environment is changing with each passing day. People realize that the original data mining methods are too limited in data acquisition, storage, analysis, and visualization and can no longer be effectively applied. If companies want to adapt to the modern and unpredictable market competition, they must explore a new management model based on big data analysis. At present, some Internet companies have also introduced and committed to analyzing and using big data and have achieved fruitful results. This shows that the world has ushered in the era of big data, and future innovation and competition will rely to a large extent on big data. Big data can connect customers with products and services through correlation analysis and position user preferences, so as to provide more accurate and oriented products and services, and improve sales performance. For example, big data helps social networking sites to provide more accurate friend recommendations, provide users with more accurate corporate recruitment information, and recommend products that may be of interest to users.

Due to the rapid development of wireless communication technology and the diversification of wireless services, users have increasingly higher requirements for the resources provided by wireless networks. How to improve the performance of wireless Internet services under the premise of protecting the rights and interests of users is one of the key developments in the research of wireless communication networks. At the same time, the number of wireless Internet users has increased significantly in recent years, and more and more users use wireless Internet services in real life and work. The above situation introduces the inequality, variability, and variability of the time users use wireless networks and poses new challenges to the capabilities of wireless service providers.

Based on the financial big data of the Internet of things and wireless communication networks, many scholars domestically and internationally have conducted related research. Mei et al. believe that geological disasters are geological conditions caused by natural occurrence or human activities that can cause loss of life and property. However, their idea was not recognized because of its low practicality [1]. Fan et al. proposed that the current MD5-based wireless network mobile communication data encryption algorithm cannot effectively detect intrusion data in mobile communication. Redundant data is not removed, data encryption efficiency is low, and overall communication security is poor. The authors are researching and proposing a wireless network mobile communication data encryption algorithm based on MDEA. By applying the normalization of communication data to the DBN model, the optimal DBN detection model is constructed by changing one parameter while retaining other parameters to realize high-precision detection of intrusion data. Using signal strengths at different times, estimate the speed and processing time of the data-level movement. Through the estimation results, redundant data and inappropriate data are removed, and MDEA operations are performed based on secret data, and random numbers and timestamps are introduced to prevent external infiltration. Experiments show that the algorithm can not only improve the detection quality of intrusion data but also enhance the cleaning effect of redundant data and communication and enhance data security. The research conducted research on the security algorithm for wireless network communication but did not explain the application of this technology [2]. It was believed that with the general acceleration of information growth, financial services have been immersed in the evolution of information dynamics. Not only has the amount of data increased sharply but also the speed, complexity, and unpredictability of the "big data" phenomenon have also exacerbated the challenges faced by financial service researchers and practitioners. However, the study conducted research on financial big data but did not design relevant experiments to prove it [3].

This article analyzes the financial big data based on the Internet of things and wireless network communication technology. First, it introduces domestic and foreign scholars' research on the Internet of things, wireless network communications, and financial big data. In the method part, the framework of the Internet of things, the related technologies and algorithms designed in the wireless communication network, and the related content of financial big data are introduced. In the experimental part, this article designs a financial big data management model based on the Internet of things and wireless network communication technology. The analysis part analyzes the spectrum efficiency of different algorithms, social utility, average number of retransmissions, comprehensive scores of competitiveness in various fields of the Internet of things, and the significance of financial indicators. The innovation of this article is to use big data technology, Internet of things technology, and wireless network communication technology to build a financial shared service center framework model and a fund management framework model based on financial shared services and design the fund management process and introduce big data technology. Establish a practical financial management framework model, refine the fund management process, and solve the process setting problems encountered in actual fund management from multiple aspects such as control management and supervision management, which enriches the financial sharing service model to a certain extent. The fund management method conforms to the development trend of fund management informatization.

2. Financial Big Data Methods Based on Internet of Things and Wireless Network Communication

2.1. Internet of Things. The Internet of things is based on the Internet, expanding its users into objects, and is a network for information exchange and communication between objects. To be precise, it is through radio wave equipment, infrared sensors, global positioning system, laser scanner, and other information sensing equipment, in accordance with the agreed information exchange and agreement, to connect the object with the sensor block to the Internet. Understand intelligent network identification, positioning, measurement, monitoring, and management [4, 5]. The entire network is divided into three levels: one is a sensor network, which recognizes "objects" based on radio waves, sensors, and QR codes; the other is a transmission network, which passes through the current three networks (Internet, radio network, and communication network) or NGN (next-generation network) to realize data transmission and calculation; and the third is the application network, which is the input and output control center, such as mobile phone control and smart home appliance control [6].

The Internet of things system is mainly composed of a perception layer, a transmission layer, a data layer, an application layer, and a terminal layer. Figure 1 is a basic framework diagram of the Internet of things. This framework diagram illustrates the structure of the Internet of things system, as well as the connection between the perception layer, the network layer, and the application layer. The perception layer is composed of wireless nodes and is mainly responsible for information perception, control, and data preprocessing. This layer mainly includes perception sensors, control sensors, and video equipment devices, which are mainly used in transportation networks, lighting systems, etc. [7, 8]. The transport layer mainly transmits the collected environmental factor data to the data layer through Wi-Fi, 3G, and 4G technologies. The data layer uses expert systems, cloud computing, and other technologies to store information, which is convenient for later analysis and historical data query. Based on the results of the analysis, reasonable suggestions can be made accordingly. The application layer is mainly used for sensor detection, intelligent control, image monitoring, and data recording generation. The terminal

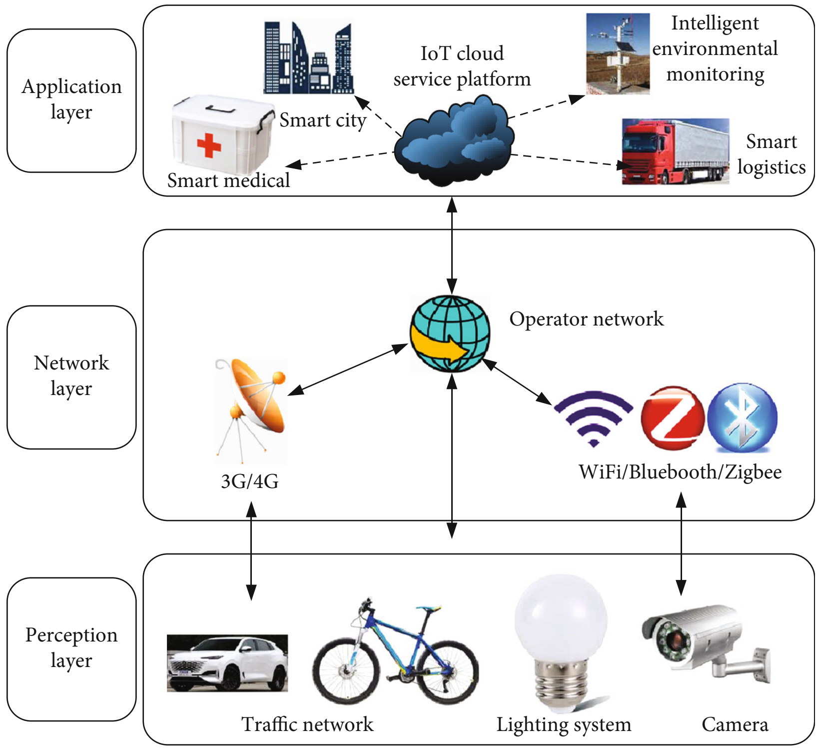

Figure 1: Schematic diagram of IoT architecture (pictures from Baidu picture).

layer can view various information parameters in real time to realize remote management of financial data [9].

2.2. Wireless Network Communication. The wireless communication technology uses electromagnetic waves or light waves to realize the information exchange between several terminals. Both electromagnetic waves and light waves belong to wireless media [10]. In fact, according to the theory of quantum mechanics, light waves are also a kind of electromagnetic waves. The difference between them is the wavelength. From the classification of the transmission distance, wireless communication can be divided into short-range wireless communication and long-distance wireless communication. First, the signal to be transmitted must be modulated onto the carrier wave. Since the general signal frequency is low, it is not easy to transmit, and the carrier frequency is high, and it is easy to transmit. So the first step is modulation. With the modulated signal, depending on the distance of the emission, it must be amplified. Then, send it to the open circuit for transmission. Radio waves are formed. Using electrical resonance in a remote place, the modulated electromagnetic wave is received and amplified in the air; then, the signal wave was detected, and then, restoration was performed. At present, Bluetooth, wireless local area network (WiFi), ZigBee, and infrared data transmission (IrDA) are common in short-range wireless communication, and these four are also widely used in short-range wireless communication [11]. The following is a brief description of these four short-range communication technologies, an introduction to application scenarios, and a comparison of advantages and disadvantages.

2.2.1. Infrared Data Transmission (IrDA). IrDA is a short-distance, point-to-point, communication technology that uses infrared as the propagation medium. Infrared rays are light that cannot be seen with the naked eye. Because IrDA uses a point-to-point connection, compared with other transmission methods during data transmission, the received interference is small and the transmission rate is fast. With the rapid development of science and technology, the IrDA data transmission rate is 2.112 kb/s, and the communication speed can reach 4 Mb/s or even 16 Mb/s. The main feature of IrDA technology is the use of infrared to transmit data with good confidentiality; it adopts point-to-point connection, which has a fast transmission rate and large transmission capacity. The disadvantage is that it is affected by the line-of-sight distance, and it is subject to certain restrictions in transmission distance, equipment installation location, and network connection, resulting in short transmission distance, relatively fixed location requirements for communication equipment, and point-to-point transmission connections that make the network inflexible. Although IrDA has shortcomings, it does not affect the development of IrDA technology. At present, infrared technology has been widely used in mobile phones and laptop computers [12].

2.2.2. Bluetooth Technology. Bluetooth uses a decentralized network structure to support point-to-point and point-to-multiple communication. The data transmission rate of Bluetooth technology is about 1 Mbit/s, and the time division duplex transmission scheme is adopted to realize full-duplex transmission. The characteristics of Bluetooth technology are as follows: free—but the mobile phone must be registered on the basis of GSM or CDMA; instantaneous—devices that receive the Bluetooth signal sent by the device can be connected at the same time, achieving flexibility, safety, and security among various devices with low-power communication; and accessibility—communication can also be carried out when encountering obstacles [13]. Bluetooth technology can be used in the automotive field, such as hands-free communication and in-car entertainment, and can also be used in industrial production to achieve monitoring and data recording.

2.2.3. ZigBee Technology. ZigBee adopts frequency hopping technology and is used in the 2.4 GHz band, which can be said to be the brother of Bluetooth technology. It is said that this technology is a technology developed based on the rules of bee colony foraging. Frequency hopping is one of the most commonly used spread spectrum methods. Its working principle refers to the communication mode in which the carrier frequency of the transmission signal of both sides changes discretely according to the predetermined law; that is, the carrier frequency used in communication is controlled by pseudo-random change code and jumps randomly. In terms of the implementation mode of communication technology, “frequency hopping” is a communication mode of multifrequency shift keying with code sequence, and it is also a communication system of code-controlled carrier frequency hopping. In general, it is mainly used in electronic equipment with a small range and low transmission rate requirements. ZigBee technology is simpler and lower in power and cost and supports more networked nodes. But the disadvantage is that the transmission rate is too low and the effective coverage is small, only between 10 and 75 m. The current application market of ZigBee technology is mainly in the fields of PC peripherals, consumer electronic equipment, toys, etc. [14].

2.2.4. RFID. RFID is radio frequency identification, commonly known as an electronic tag. Radio frequency identification technology is a technology that uses radio frequency signals to realize contactless information transmission through spatial coupling and achieves the purpose of identification through the transmitted information. At present, the working frequencies of RFID products include low frequency, high frequency, and ultrahigh frequency. RFID products in different frequency bands have different characteristics. RFID technology is widely used in many fields, such as industrial automation, commercial automation, transportation control and management, and anticounterfeiting.

2.2.5. WiFi Technology. The full name of WiFi is Wireless Fidelity, and it uses the frequency band near 2.4 GHz. WiFi is a technology distributed in 2.4G and 5G frequency bands, allowing devices to access WLAN. In essence, it is to convert wired signals into wireless signals, so that devices in a certain range can access the network without being wired. For example, mobile phones connect to the Internet through WiFi routers. The standards currently used by WiFi are IEEE802.11a, IEEE802.11b, and IEEE802.11g. The effective transmission distance of WiFi technology is long, up to about 300 m; the transmission speed is fast, up to 11 Mbs; the network is flexible, and it is a short-distance transmission communication favored by various manufacturers. But there are still shortcomings such as poor signal quality and low security performance [15, 16]. Table 1 shows the comparison of IEEE802.11 parameters.

2.2.6. Single-User MIMO Model. MIMO is called multiple input multiple output, which involves multiple transmission paths created by multiple antennas. The base station must support multiantenna transmission, and the mobile phone must also use multiantenna reception to cater to it. The advantage of MIMO is that it can increase wireless range and improve performance. As a typical multiantenna system, MIMO can significantly increase the transmission rate. In an actual wireless system, one or more diversity methods can be used according to actual conditions. If the MIMO system is used to increase the rate of one user, it is called single-user MIMO [17].

Figure 2 is a typical MIMO system, including n_d transmitting antennas and n_f receiving antennas. Here, the matrix T is used to represent the transmission channel matrix between the transmitting antenna and the receiving antenna:

$$T = \begin{bmatrix} t_{11} & \cdots & t_{1n_d} \\ \vdots & \ddots & \vdots \\ t_{n_f 1} & \cdots & t_{n_f n_d} \end{bmatrix}. \quad (1)$$

Among them, t_{mn} in the matrix T represents the channel fading coefficient between the mth transmitting antenna and the n receiving antennas. Selective fading is related to the characteristics of the channel and signal. Under certain circumstances, they may become flat fading. For example, frequency selective fading occurs when the coherent bandwidth of the channel is less than the bandwidth of the signal. When the coherent bandwidth of the channel is more than the bandwidth of the signal, it is no longer frequency selective fading but flat fading. Frequency selective fading is the main component of multipath fading. Then, the manifestation of the signal received by the system is

$$j = Tr + n. \quad (2)$$

Among them, r represents the transmitted signal column vector of n_d. The autocovariance matrix of the received signal is

$$K_{jj} = TK_{rr}T^T + \vartheta_n^2 U_{n_f}. \quad (3)$$

Among them, K_{rr} is the autocovariance matrix of the transmitted signal and U_{n_f} is the identity matrix of $n_f * n_f$.

2.2.7. Free Space Spread. In the propagation environment of wireless network communication, there is a special propagation space. In this kind of propagation space, the

Table 1: Comparison of IEEE802.11 standard parameters.

Standard	Bandwidth	Maximum speed	Signal range
IEEE802.11a	5	52	30-120
IEEE802.11b	2.3	12	35-130
IEEE802.11g	2.3	52	35-120

propagation medium is evenly distributed, and the propagation signal is an ideal medium space with the same direction, which is called free space [18, 19]. The receiving end of the free space exists:

$$K_s = \frac{Q_i Q_s \gamma^2}{(4\pi l)^2} K_i. \quad (4)$$

Among them, l is the linear distance from the receiving antenna to the transmitting end, γ is the carrier wavelength, K_i is the transmitting power of the communication station antenna, Q_i is the gain of the receiving end antenna, and Q_i is the gain of the transmitting end antenna. In addition, path loss will occur during the propagation process, which is caused by the propagation distance. The free space propagation loss formula is

$$D_G = \left(\frac{4\pi \mathrm{l}}{\gamma}\right)^2. \quad (5)$$

Among them, D_G is the free space loss. Take the logarithm:

$$D_{cv} = 10 \lg \frac{Q_i}{Q_s} = 20 \lg \left(\frac{4\pi l}{\gamma}\right) = 20 \lg \left(\frac{4\pi l v}{t}\right). \quad (6)$$

Among them, v is the frequency of electromagnetic waves and t is the speed of light. Substitute in

$$D_{cv} = 32.44 + 20 \lg v + 20 \lg l. \quad (7)$$

According to the previous free space loss calculation formula, the higher the frequency, the greater the free space loss. This is because the energy loss in free space is energy diffusion loss, which is independent of frequency. The reason why the free space loss is related to frequency is to simplify the calculation, because the gain of the receiving antenna is related to frequency.

2.2.8. Spectrum Efficiency and Energy Efficiency. For wireless network communication technology, proper measurement is very important in network planning and design. Generally, two indicators, spectrum efficiency and energy efficiency, are used to measure system performance. Among them, the main standards for measuring spectrum efficiency are bps/Hz and bps/Hz/m^2, and the indexes to measure energy efficiency are bps/W and bps/Hz/W [20]. In the analog signal system, bandwidth refers to the amount of data that can be transmitted at a fixed time, that is, the ability to transmit data in the transmission pipeline. It is usually expressed in transmission cycles per second or Hertz (Hz). In digital signal equipment, bandwidth refers to the amount of data that can pass through the link per unit time, usually expressed in bps, that is, the number of bits that can be transmitted per second.

The bps/Hz standard is used to measure frequency efficiency. The system capacity of a communication system is

$$P \le A \log_2\left(1 + \frac{S}{N}\right), \quad (8)$$

where P represents the system capacity, that is, the number of bits that can be transmitted per second, S/N represents the signal-to-noise ratio, and A represents the bandwidth. In addition, considering the characteristics of the channel itself, the system capacity can also be expressed as

$$P = A \log_2\left(1 + \frac{\omega v F}{\rho A}\right). \quad (9)$$

Among them, ω represents a constant related to adaptive modulation and coding, v represents the channel gain, and ρ represents the noise power spectral density. When the spectrum resources are limited, considering the spectrum efficiency, it can be expressed as

$$\mu = \frac{P}{A} = \log_2\left(1 + \frac{\omega v F}{\rho A}\right). \quad (10)$$

The bps/Hz/m^2 standard represents the unit coverage area and the energy carrying information on the unit frequency band. Suppose the coverage area of the base station is

$$\mu_{\mathrm{ASE}} = \frac{\int_0^r (1 + \mathrm{s}/\mathrm{n}) F(s/n) ls/n}{\pi r^2}. \quad (11)$$

Among them, r represents the radius of the coverage area and s/n represents the signal-to-interference and noise ratio.

bps/W is generally used to brighten the information bits per unit of transmitted energy. According to Shannon's theorem, the capacity of the Gaussian white noise channel is

$$P = \frac{1}{2} \log_2\left(1 + \frac{F}{s/nA}\right). \quad (12)$$

The Nyquist sampling theorem explains the relationship between the sampling rate and the frequency of the measured signal. It is stated that the sampling rate μ must be greater than twice the highest frequency component of interest in the measured signal. According to the Nyquist sampling theorem, energy efficiency can be expressed as

$$\mu_{\mathrm{EE}} = \frac{P}{F} = \frac{2P}{s/n\left(2^{2p} - 1\right)}. \quad (13)$$

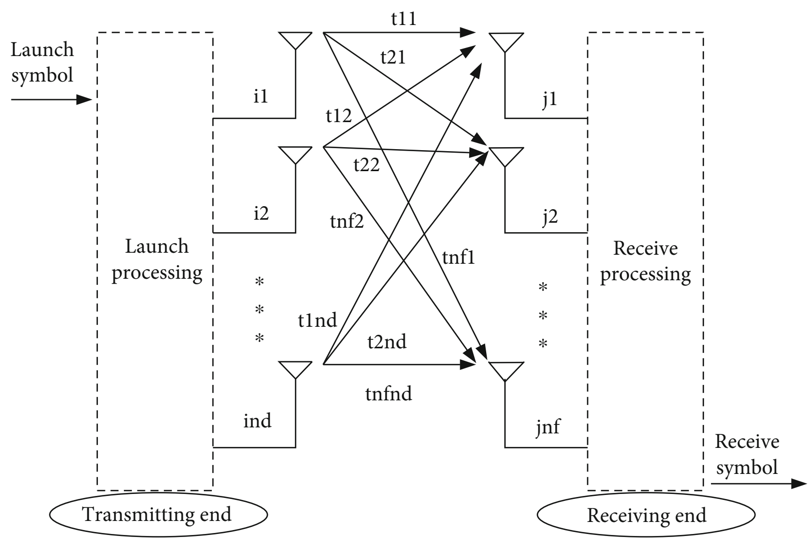

Figure 2: Single-user MIMO model.

It can be seen that μ_{EE} monotonically decreases with P; when $P \longrightarrow 0$, $(\mu_{EE})_{max} = 1/(s/n \ln 2)$ reaches the maximum value, and when $P \longrightarrow \infty$, $(\mu_{EE})_{max} = 0$.

At the same time, there is also a certain relationship between circuit energy consumption and data transmission speed. Redefine the energy efficiency formula as

$$\mu_{EE} = \frac{P}{F + F_P} = \frac{2AP}{s/nA\left(2^{2P} - 1\right) + F_P}. \tag{14}$$

In addition, bps/Hz/W can be considered on the basis of the bps/W standard, that is, spectrum efficiency. This standard combines energy efficiency and spectrum efficiency, and the expression is

$$\mu_{EE} = \frac{P}{F \cdot A} = \frac{2P}{s/nA\left(2^{2P} - 1\right)}. \tag{15}$$

2.3. Financial Big Data. The financial industry can use big data in the process of developing traditional financial services, and after processing massive amounts of data through information technology, it can realize financing and complete the innovation of financial services. In order to better reach customers, many financial institutions have gradually begun to use big data [21].

Comprehensive decision-making financial data refers to all the structured, semistructured, and unstructured data inside and outside the enterprise, which can reflect the business situation of the enterprise and the development of the industry in which it is located. These data can help enterprise managers to formulate scientific and correct financial decisions [22, 23]. The acquisition of comprehensive decision-making financial data is usually to collect other relevant data that affects the decision-making of enterprise managers, including the collection of information in the accounting system and financial management system, and uses the enterprise local area network to collect human resources, customers, and suppliers. Collect other information, and use the Internet to collect external government policies, social changes, industry development status, and financial information disclosed by other companies in the same industry [24].

After receiving financial data from different sources, it must be stored. For the business data and other financial data in the integrated decision analysis, they must all be stored in the data repository. This database is different from the traditional simple database. It is the center for storing financial data. It uses the principle of extracting, transforming, and loading data (ETL) to convert various types of data into professional information. Figure 3 shows the framework of the financial data system [25].

A financial management method is an important part of financial management. The core of financial management theory is the theory of the financial management method, which runs through the whole theoretical system. The important significance of corporate financial analysis includes the following three aspects. First of all, financial analysis is an important tool for companies to evaluate business operations and financial status. Through the calculation and analysis of enterprise business data and accounting data, it is possible to obtain the most intuitive evaluation of the enterprise's debt repayment, operation, and profitability and help the management to make timely scientific decisions and formulate a fair reward and punishment system. Secondly, corporate financial analysis is an important method for companies to examine their own potential and discover growth points for performance. The important goal of modern company management is to maximize profits. Financial analysis can help companies discover the source of their own profits and the company's operation, so that companies can discover potential profit contributions in time and further promote the company's benign operation. Finally, corporate financial analysis can help outsiders such as banks, governments, and investors to understand and fairly evaluate the company. Through corporate financial

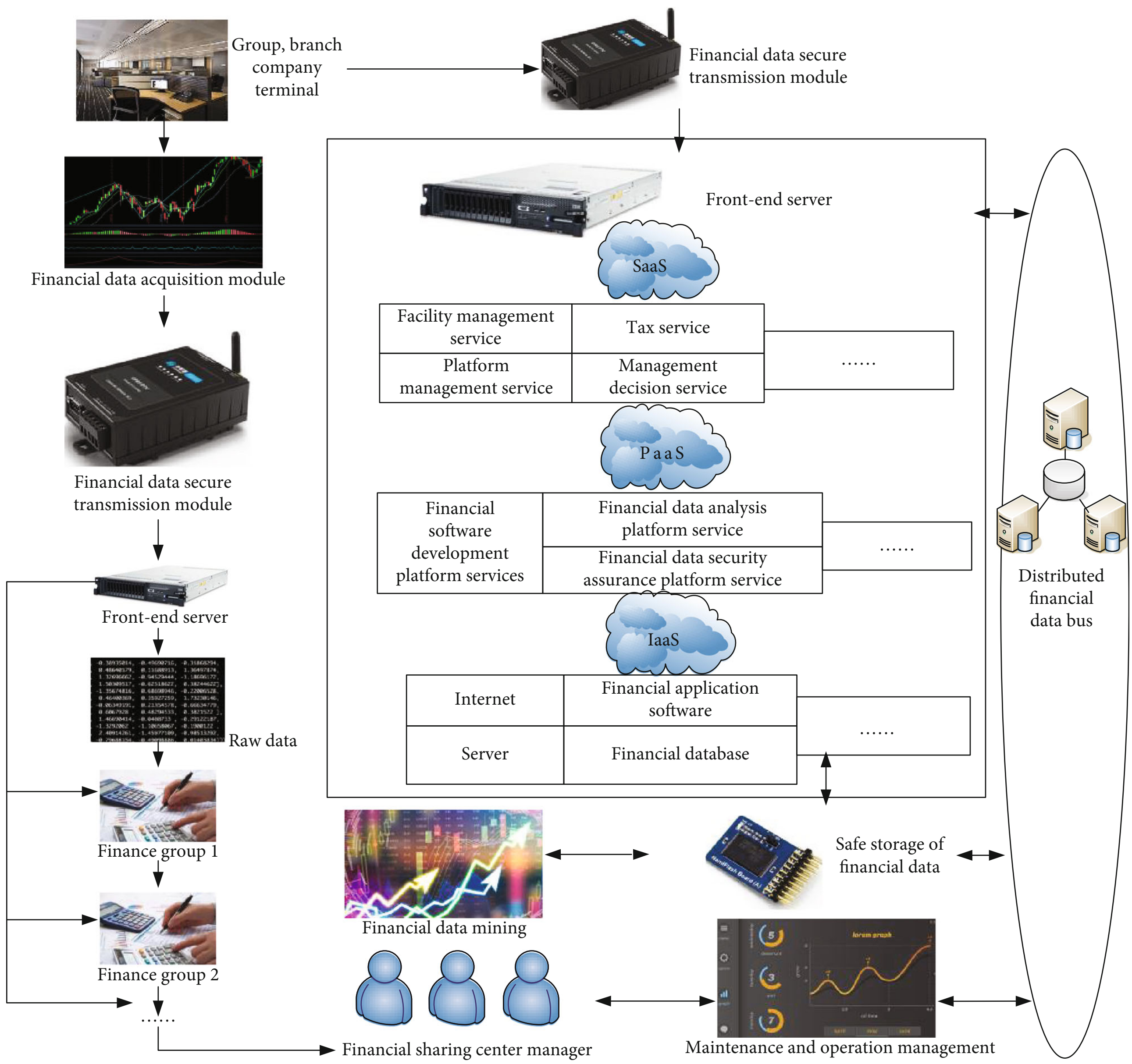

FIGURE 3: Financial shared data framework (pictures from Baidu picture).

analysis, investors and stakeholders can obtain detailed corporate financial status, operational capabilities, solvency, profitability, and development prospects in a timely manner.

3. Financial Big Data Experiment Based on Internet of Things and Wireless Network Communication

3.1. Experimental Design. This article explores and analyzes financial big data based on the Internet of things and wireless network communications and designs an experimental process [26]. First, collect big data. By building a big data collection platform, different types of financial data collection, processing, and extraction capabilities can be empowered, and the consistency, accuracy, timeliness, and systemicity of financial big data can be achieved. Then, use the Internet of things and wireless network communication technology to quantitatively analyze the big data. Build a financial big data cloud computing platform, and use cloud computing technology to process and analyze tens of millions of financial big data in real time. Third, look for relevance [27]. Use data mining capabilities to discover the relevance of the problems behind financial big data; fourth, provide solutions to financial big data problems. The biggest change in corporate financial management decisions in the era of big data is to abandon the study of causality and focus on related issues instead. Big data can be used for financial crisis early warning [28, 29].

3.2. Experimental Environment. This test is mainly based on the developed shared parking space management system.

The test is mainly carried out in the public network environment. The public network environment is more complicated, the network delay is longer, the performance requirements of the server and the ground lock are higher, and the test is more practical.

Table 2 is a description of the server disk configuration of this experimental environment. The server has a 1-core 2 GB installed memory, a basic bandwidth of 1 Mbps, an Ubuntu 16.04 system, and a 64-bit operating system, which basically meets the test requirements.

Table 2: Server configuration.

Server system	Configuration
RAM	1 core 2.0 GB
Basic bandwidth	1 Mbps
System disk	40 G ordinary cloud disk
System type	Ubuntu 16.04 64 bits

3.3. Experimental Subjects. The objects of this experiment include the financial databases of various companies. The system of this article is used to identify these data, so as to obtain the accuracy and misrecognition rate of the recognition and use regression analysis to calculate the significance of each financial index. In terms of wireless communication networks, this experiment calculates and collects data on indicators such as signal-to-noise ratio, spectrum efficiency, social benefits, data packets, packet loss rate, and the number of retransmissions. In addition, statistics on the competitiveness of various fields in the Internet of things are also conducted. The signal-to-noise ratio refers to the ratio of the average power of the signal to the average power of the noise. The packet loss rate refers to the ratio of the number of data packets lost in the test to the data group sent.

4. Financial Big Data Analysis Based on Internet of Things and Wireless Network Communication

4.1. Spectral Efficiency of Different Algorithms. As shown in Figure 4, the algorithm in this paper can be regarded as an ideal collaboration between the base station and the user side. Therefore, with the continuous increase in the signal-to-noise ratio, the efficiency is greatly improved, and the optimal spectrum efficiency can be obtained. Obviously, the efficiency of IA-CoMP is the lowest. For example, when the signal-to-noise ratio is 20, the spectral efficiency of this algorithm is 6.45, IA-CoMP is 4.61, and IAN-CoMP is 5.98. The IA-CoMP algorithm is based on user-side cooperation and uses serial interference cancellation for interference cancellation, and its efficiency is lower than that of IAN-CoMP. IAN-CoMP utilizes a limited degree of cooperation and uses transmit precoding based on IA and IN to eliminate and suppress interference, so as to obtain performance close to the algorithm in this paper.

4.2. Social Utility. Figure 5 shows the comparison of the social utility of different algorithms. The abscissa shows the number of secondary users, ranging from 100 to 700. By comparing the data, we know that the algorithm in this paper is better than the other two algorithms. When the number of users is 100, the social utility of the algorithm in this paper is 4.45, while IAN-CoMP is 3.43 and IA-CoMP is 3.67. When the number of users increases to 700, the social utility of the algorithm in this paper is 28.34. The other two algorithms are, respectively, 24.45 and 25.99. It can be seen that the social utility of the algorithm in this paper is the best, and the IA-CoMP algorithm is better than the IAN-CoMP algorithm.

4.3. Average Number of Retransmissions. The average number of retransmissions refers to the average number of transmissions required for each data packet to be successfully transmitted to the receiving end. This indicator is a key factor affecting the transmission performance of the wireless communication network. Here, we compare the average number of retransmissions of the algorithm proposed in this paper, ARQ algorithm and WONCR algorithm under different numbers of data packets.

Figure 6 shows the comparison of the average retransmission times of each algorithm when the number of data packets changes. At this time, the number of control receiving nodes is $n = 10$, and the average packet loss rate of the link is $\rho = 0.5$. It can be seen from the figure that the average number of retransmissions of the algorithm in this paper is much lower than that of the traditional ARQ algorithm and WONCR algorithm. For example, when the number of data packets reaches 60, the number of retransmissions of the algorithm in this paper is 1.49, while the ARQ algorithm is 1.914 and the WONCR algorithm is 1.823. This is because the two algorithms ARQ and WONCR both use a greedy algorithm to ensure that the receiving end obtains a higher retransmission income. In addition, with the increase in the number of data packets, the number of retransmissions of these three algorithms has shown a downward trend. This is because the increase in the number of data packets also increases the probability of finding the most profitable encoding packet. This is the most obvious decline of the algorithm in this paper, and the other two algorithms have shown a gentle trend when the data packet range is 40-60.

In addition to studying the relationship between the number of data packets and the average number of retransmissions, this paper also designs a study on the average packet loss rate versus the average number of retransmissions. Control the number of receiving nodes $n = 10$, and the number of data packets is $Q = 60$.

Figure 7 shows the relationship between the average packet loss rate and the average number of retransmissions in the three different algorithms. Obviously, the average retransmission times of the three algorithms all increase with the increase in the packet loss rate. It can be seen that the loss times of the ARQ algorithm and the WONCR algorithm are always larger than those of the algorithm in the data packet loss rate range of 0.1-0.5. For example, when the packet loss rate is 0.5, the number of retransmissions of the algorithm in this paper is 2.876, while the ARQ algorithm is 3.098 and the WONCR reaches 4.868. In addition,

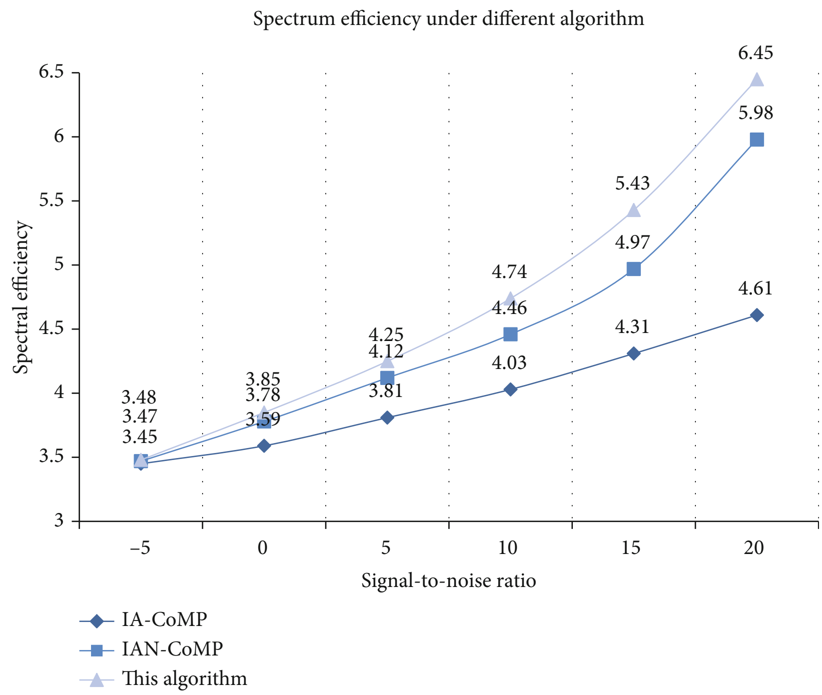

Figure 4: Spectrum efficiency under different algorithms.

Figure 5: Social utility comparison.

for both ARQ and WONCR algorithms, when the packet loss rate is lower than 0.3, the number of retransmissions of ARQ is greater than that of WONCR, but when the packet loss rate is higher than 0.3, the number of retransmissions of WONCR starts to be greater than that of ARQ. When the packet loss rate is small, the probability of WONCR selecting a solvable coded packet is greater than that of ARQ, and when the packet loss rate is large, the probability of this unsolvable coded packet gradually increases.

4.4. Comprehensive Scores of Competitiveness in Various Fields of the Internet of Things. Various fields of the Internet of things, such as two-dimensional code, RFID, and other technologies, are also competitive. Here, we will rank and

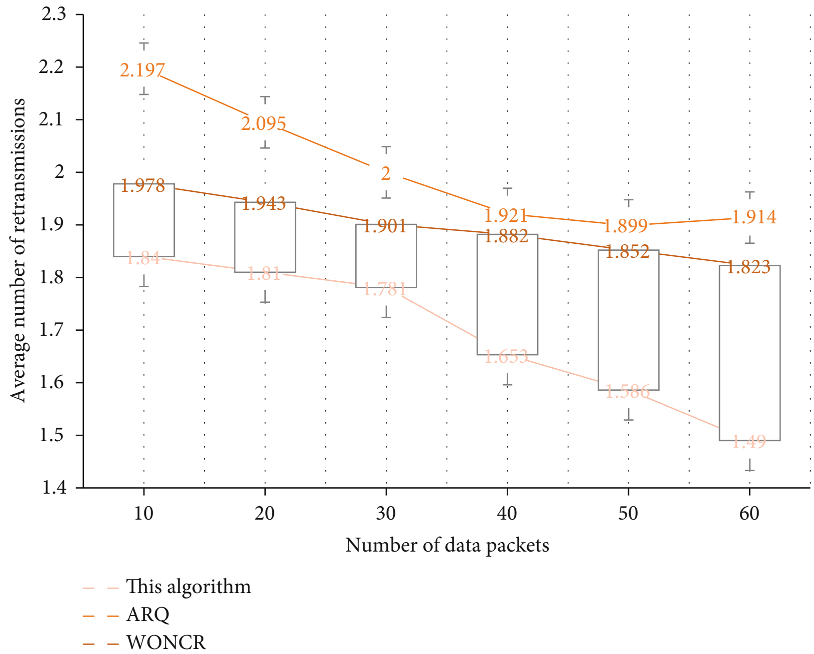

Figure 6: Comparison of the number of retransmissions when the number of data packets changes.

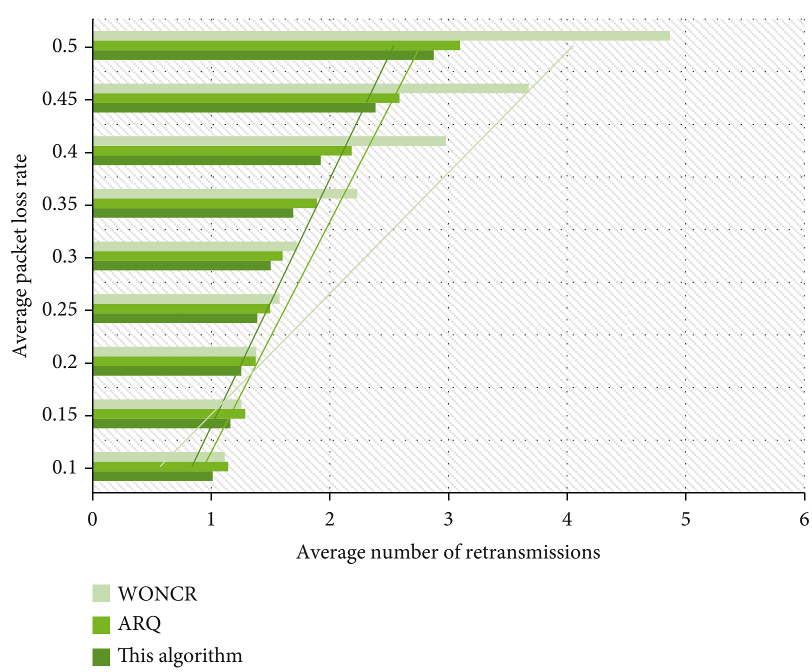

Figure 7: Change in the average packet loss rate is a comparison of the number of retransmissions.

comprehensively score these technologies to understand the importance of different fields.

Table 3 shows the comprehensive scores of competitiveness in various fields of the Internet of things. Through comparative analysis, we can see that there are also polarizations in various fields of the Internet of things. QR code and RFID technology rank 3rd in the field of Internet of things, with an average of 0.02837 and a range of 0.83642, while smart medical ranks the worst, with an average of -0.31785 and a range of 0.67521. This result shows that in terms of competitiveness, the development level of these fields with an average value of more than 0 is at the forefront of this industry, while fields such as smart medical care are less competitive.

4.5. Financial Indicator Significance Analysis. This paper analyzes the significance of financial indicators, including asset-liability ratio, quick ratio, current ratio, account receivable turnover rate, inventory turnover rate, capital profit

Table 3: Comprehensive score of competitiveness in various fields of the Internet of things.

Fields	Average value	Rank	Extreme deviation
QR code and RFID	0.02837	3	0.83642
Sensor	-0.12974	5	0.60987
Cloud computing	0.28744	1	1.54763
Smart medical	-0.31785	7	0.67521
Smart grid	-0.30894	6	0.04875
Satellite positioning system	-0.12329	4	0.30878
Financial and insurance system	0.15784	2	0.96732

Table 4: Regression results of each variable.

Variation	*B*	S.E	Wald	df	Sig.
X1	0.673	5.012	0.021	1	0.083
X2	-0.162	4.892	0.002	1	0.026
X3	2.284	4.219	0.298	1	0.014
X4	-3.523	4.011	0.729	1	0.089
X5	-0.012	0.039	0.142	1	0.051
X6	1.233	8.999	0.023	1	0.042
X7	-2.098	2.542	0.701	1	0.046

Table 5: Forecast result.

Actual results	A company	Non-A company	Accuracy	Misjudgment rate
A company	9	1	88.89%	11.11%
Non-A company	4	17	80.95%	19.05%
Total			84.92%	15.08%

rate, sales profit rate, and a series of financial indicators, and selects 7 significant financial indicators as variables for regression analysis and substitutes them into the SPSS software for analysis.

It can be seen from Table 4 that it is the regression result of each financial indicator variable. It can be seen that the Sig values of these seven financial indicators have reached the ideal state; that is, the Sig value is less than or equal to 0.1. In addition, these seven indicators have stronger early warning capabilities for financial crisis early warning models. From the perspective of the nature of the indicators, they basically cover the solvency, development capabilities, and operating capabilities of enterprises, indicating that the statistical analysis has theoretical capabilities and is scientific and reasonable.

4.6. Recognition Effect Analysis. Introduce 31 big data indicators for inspection samples in 2020, of which 10 are financial data samples from A company and the other 21 are from other companies to make early warning judgments.

It can be seen from Table 5 that the accuracy rate of this research model for the sample of A company is 88.89%; for the sample of non-A company, the accuracy is 80.95%, and the overall accuracy rate reaches 84.92%. It can be seen that for the overall prediction accuracy, the use of the financial big data model based on the Internet of things and wireless communication can indeed improve the accuracy, which is 11.11% higher than the accuracy of the model without the introduction.

5. Conclusion

With the development of the economy and the advent of the era of big data, companies can collect and store all business data, but how to convert data into business value and help them make decisions has become a top priority. The traditional financial analysis model has a single data collection, a single financial analysis result, and a certain delay, which cannot meet the needs of today's information developers. Therefore, the financial analysis in enterprises urgently needs the application of advanced technology. This paper proposes financial big data based on the Internet of things and wireless network communication and conducts research and analysis on this system in many aspects. At the same time, this article also has some shortcomings: due to the complex wireless network scenarios, resource allocation based on network environment and user decision-making involves more research content. This article only analyzes a few specific scenarios and resources. The content of the research still has certain limitations; in addition, the impact of big data on corporate financial evaluation is how companies can improve financial evaluation methods in a big data environment, restore financial reference systems, and ensure the security of financial information in a big data environment. One problem has not been analyzed too much.

Data Availability

Data sharing does not apply to this article because no dataset was generated or analyzed during the current research period.

Conflicts of Interest

The author declares that this article has no competing interests.

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