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Research Article

Development and Simulation of a Fast Delay Cancellation Algorithm for Digital Multimedia Network Communication

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The digital multimedia network data traffic is huge, and many end devices are applied to the digital multimedia network; therefore, the digital media network communication delay transmission must be analysed in order to improve the performance of the digital multimedia network communication transmission. Due to the presence of a large number of data packets in the communication network used, some random delays in data can occur during use. Conventional data transmission methods rely solely on extended data storage capacity to achieve this, making it difficult to achieve intelligent scheduling, resulting in delays and optimized performance degradation during communication data transmission. The aim of this paper is to enhance the communication quality of digital multimedia networks by developing an algorithmic model that rapidly mitigates communication delays. The proposed approach employs a delay cancellation algorithm in a network predictive control system. Simulation techniques are utilized to simulate and compensate for delays in multimedia communication networks. The efficacy of the network control strategy is demonstrated through simulation tests on a large-scale multimedia network communication system. The research findings indicate that the network control prediction model and elimination algorithm can substantially reduce the packet loss rate and quickly eliminate communication delays in digital multimedia networks.

1. Introduction

Multimedia network communication latency is a delay in multimedia network communication from the web server to the end-user. In a multimedia network, transmission delay and bandwidth are key to its transmission efficiency. In order to improve the transmission efficiency of multimedia networks, the transmission delay must be minimized [1]. There are two types of delay suppression methods that exist in current large-scale multimedia networks: one is the use of robust WADC, which is insensitive to certain delays but cannot address the root cause of the impact on the system due to communication delays, while at the same time building a complex linear matrix inequality structure, which is highly applicable to large-scale multimedia network communication systems; the second is to design the control system. When the control system is designed, a certain communication delay is compensated by a certain time interval; however, the target of compensation is mostly the already transmitted network data and the stationary communication delay, which is difficult to complete the compensation of the communication delay of uncertain and no signal source; however, in the large-scale multimedia network communication, this delay is more manifested as the uncertain dynamic communication delay [2]. Digital multimedia communication networks represent a novel form of network media. Investigation using a network predictive control system revealed an evident delay rate in digital multimedia communication networks. To address this challenge, an antidelay communication technique based on network predictive control is introduced. This technique achieves delay compensation in large-scale multimedia networks through network and control. The ADCT communication technique offers the advantages of predictive control, which include reduced reliance on system models and enhanced robustness. Furthermore, it surpasses traditional control of a single channel and a single data stream by using vector real-time control of data streams. The technique employs predetermined control to compensate for the time delay of large-scale multimedia networks, thus achieving the objective of eliminating and reducing communication delays.

2. The Latest Technology of Digital Multimedia and Network Communication Delay

2.1. Network Communication Delay Calculation. Multimedia networking is a computer technology that integrates modern communication technology with computer technology. As an integrated, interdisciplinary technical discipline, multimedia networking technology is a combination of computer technology, network application technology, and communication technology [3]. In wireless sensor networks, various methods are available to eliminate communication delays, including the delay control method, graphical thinking method, and ant colony optimization method. The communication delay elimination technology based on the delay control method calculates the minimum node of communication network transmission and devises a transmission path with the minimum energy loss in the information transmission channel. The wireless sensor communication network, based on the graphical idea, utilizes the principle of minimum power to select the optimal node and extend the network life cycle. Communication network delay elimination based on ant colony optimization employs the elimination fitness function to expedite the removal of communication network delays. Accurate estimation of network latency is a topic that is currently in urgent need of solution on the network. Network delay is the extended time of transmission from the network server to the mobile terminal. The analysis of network latency provides a better reflection of the variation in latency in the network and is used to guide and monitor digital multimedia network communications. Currently, the main ways of calculating network latency are latency using nonlinear transformation and network latency using Bayesian latency calculations. Of these problems, the most common is the use of network cascade images for network delay estimation [4]. It has good scope for development because of its wide range of applications in many production and everyday uses. However, traditional methods of calculating network latency have their shortcomings. The assumed large size and complexity of the system can cause differences between different network nodes, causing them to collide when collaborating and affecting the accuracy of the network latency. In order to solve the traditional network delay calculation problem, this paper adopts a new method using pseudolikelihood estimation to determine the network delay. Based on this, a linear transformation method based on wavelet analysis is used to analyse the state parameters of the network. Simulation analysis of the method is carried out using the pseudolikelihood estimation method. The experiments proved that the method can better reflect the magnitude of the network delay. This is shown in Table 1.

Table 1: Comparison of network communication delays.

Traditional computing	Pseudolikelihood estimation	Simulation analysis
Large scale	Large scale	High latency
High complexity	Low complexity	Low latency

2.2. Digital Multimedia. A digital multimedia network is a network consisting of multiple sensors in various forms or multiple static or motion; the purpose of which is to transmit, sense, process, and collect information [5]. In digital multimedia, communication protocols specify the form of information units to be used, while the information units contain the timing of the sending and receiving of information, the method of connection, etc. Due to the development of society, the increasing demand for information has led to a rapid growth in the amount of information in digital media networks, which has caused problems with communication delays in the network. A digital media acquisition system based on multiple platforms is designed using multiple platforms in order to improve its adaptability to information resources and ensure that the acquisition of information is achieved on multiple terminals. This system ensures that each platform can use a unified service, resulting in a unified architecture. In Figure 1, the system architecture is shown, which comprises a terminal unit, a network unit, and an enterprise-level unit, said terminal unit being said display end of said multiple platforms; a multimedia network unit for the network services supplied by each network operator to complete the information transfer; and an enterprise-level unit that can generate WebService business terminals consisting of system control, audit solutions, and data storage, and other media systems can be linked to them [6]. In the cluster, a data transmission network based on different channels is constructed by using different channels according to a uniform information form. The system consists of channel devices, link protocols, and information processing and format information.

2.3. Digital Multimedia Broadcasting Technology. According to different transmission channels, they can be divided into three categories. They are satellite digital transmission, cable digital television, and terrestrial digital television. Satellite digital TV usually uses phase-shift keying technology to provide better modulation and less signal noise in the transmission path, which is suitable for broadcasting from satellite [7]. Its wide communication coverage and low-cost receiving equipment make it very popular abroad, but its disadvantages are that it depends on space satellites, which have low bandwidth utilization, high launch cost, and poor launch conditions. Therefore, NFC technology accounts for a large proportion of SFG-S in Europe. The error correction performance of the first SFG-S used in Europe is 7 (234,34). In the second generation of SFG-H, the encoded LKD code is used in conjunction with the BCK convolutional code scheme. Wired DTV is usually modulated by orthogonal amplitude, which has very fast modulation rate and high signal-to-noise ratio, and is especially suitable for optical fiber and coaxial optical fiber cables with good transmission conditions. Due to the good network transmission conditions, the transmission speed between mobile terminals and servers is faster, and all types of interactive digital TV

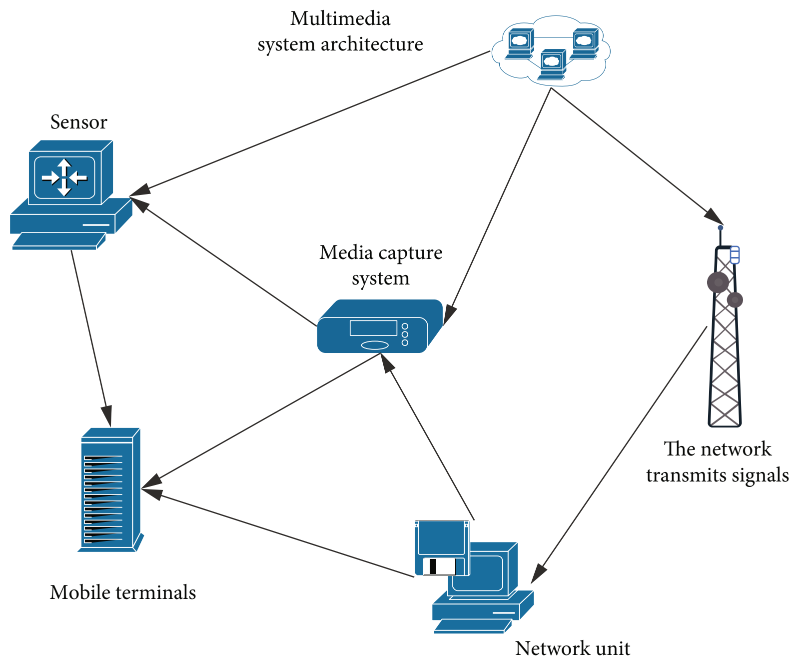

Figure 1: Multimedia network system architecture.

Table 2: Convolution code of foreign cable digital TV.

United States	J138	(234,34)
Europe	SFG-S	(288,24)
Japan	SFG-D	(288,28)

services can be two-way transmitted in the cable network. The European standard SFG-S is the most widely used cable specification today. It only uses convolutional code with good error correction ability as error correction protection. The convolutional code of SFG-D is mainly used in Japanese cable digital television, and the error correction performance is (288,28). American digital multimedia broadcasting also has good error correction performance. The convolutional code sequence is 15, which is an error correction method, as shown in Table 2.

The present paper begins by examining the fundamental principle of network communication delay cancellation. Specifically, the paper employs interference cancellation technology as the primary means to eliminate network communication delay. Subsequently, the paper proposes an optimization method designed to eliminate the communication delay encountered in digital multimedia networks. To this end, the autoregressive integral sliding model is applied to address the communication delay encountered in digital multimedia networks, while the likelihood estimation method is utilized to precisely quantify the communication delay of digital multimedia networks, thereby facilitating rapid elimination of the network communication delay. Finally, through an analysis of simulated experimental data, the paper concludes that the network predictive control model can effectively eliminate the network delay experienced in digital multimedia communication.

3. Principle of Network Communication Delay Cancellation

Firstly, using an optimization approach, the single hop frequency wireless network monitoring area during communication is divided into a number of different sized gates, information on each node in the single hop maximum communication area between cells is collected, and the total coverage of each stationing point and the energy consumption of each point is evaluated and solved for using a genetic algorithm to achieve the elimination of the signal delay passed in communication [8]. The steps are detailed by the following: assuming that V_d denotes the centre of all gates during wireless network communication and x_a denotes the condition indicator of the residing position of the pooling node during network communication, if $x_a = 0$ is met, the pooling node no longer gathers information at the centre n of the grid and the number of positions N_m required for the pooling node to stay is derived from

$$N_m = x_a + \sum_{d=1} V_d \cdot \sin x \cdot \frac{m}{m_1}. \tag{1}$$

On this basis, the data cycle of a sink node is divided into two stages: the first stage is to transmit the sink node data to the network cellular node through a single channel; the second stage is to further process and compress the data source of the network cellular node into the network data unit structure.

Based on the above algorithm, the time delay of the system can be estimated, laying the foundation for the evaluation of the system's operational performance [9]. However, when the scale of the network is relatively large and the

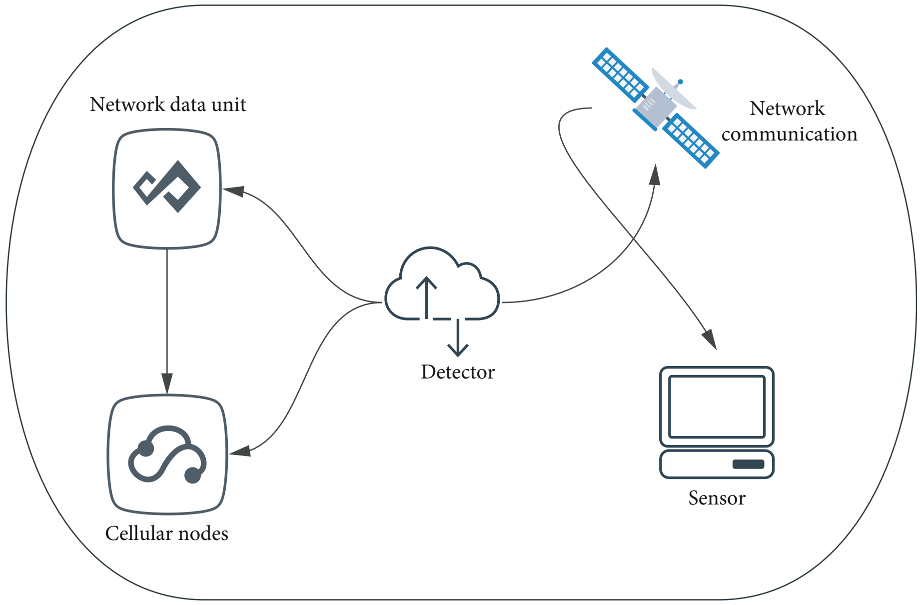

Figure 2: Network communication detector structure.

complexity of the network is relatively large, the use of the above algorithm for network time delay can lead to collisions among the network nodes in digital multimedia network communication, resulting in a decrease in the accuracy of the network time delay. In the solution of the network time delay, the network is divided into multiple detection targets, which are referred to as a detection unit. The network time lag of this system is essentially the same in a given detection unit and can be approximated using the method of seeking guidance. Figure 2 can be used to illustrate the construction of the detector unit. The problem of communication latency in conventional digital multimedia networks is addressed using current techniques for network communication latency exclusion, using the theory of Markov links. For optimal network communication conditions, a method based on interference cancellation is proposed to overcome the traditional digital media communication latency.

Denote $S=$ (excellent, medium, average, poor) the condition of a digital media network node as judged by the packet loss rate and use the condition of that node to determine its transmission rate; P denotes the probability transfer matrix determined by a change in the level of the nodes in the network, which is given by

$$P=\sum_{i=1}^{n} \sin x+\frac{\sqrt{\cos x}}{\lambda+\sin a}. \tag{2}$$

On this basis, the optimal network communication is achieved by using the restricted allocation of nodes. Denoting $X(t)$ as the communication signal in the digital multimedia network, $K(t)$ as the composite number corresponding to the communication channel of that network, denoting the perturbation of the receiver noise, and M as the diameter in the digital media, the expressions are as follows.

$$M=\frac{\sin a+\tan x+f(x)}{\sum_{a=1}^{k} k(t)-X(t)}, \tag{3}$$

where j denotes a complex operator and f denotes a linear channel; g denotes the signal amplitude decay over k channels; l denotes the delay generated by the communication signal in the kth channel; and u denotes an arbitrary phase of the communication path. The correspondence between the transmit signal $D(t)$ and the transmit signal $B(t)$ is obtained from the channel response as follows.

$$\begin{aligned}
D(t)&=\frac{\sin t-a\cdot u}{\iint \tan k+\sin u},\\
B(t)&=\sum_{t=1}^{n} \omega \sin a+\sqrt{k\cdot ar\tan D(t)},\\
1&=\oiint \sin a+\frac{\cos t}{\cos a+\sin k}-f(x),\\
j&=\left\|\sin t-\sum_{a=1} \cos a+\eta \tan a\right\|,\\
f&=\frac{\sum_{a=1}^{n} T-\cos a}{|\tan x+\tau|},\\
g&=\frac{\sin j-f(x)+\theta}{\pi+\cos l},\\
u&=\sum \sigma+\sin(t)-f(\sin a-\tan x).
\end{aligned} \tag{4}$$

In order to obtain a network segmentation channel, the authentication nodes put out by digital multimedia must be authenticated. By examining the interactive records of data transmission within the network, the results show that there is an abnormal match between the set of authentication nodes when the message arrives at the network node, resulting in a redundant node after authentication. Also, the inability of the redundant nodes to acquire the channels allocated by the gateway caused problems with digital authentication delays [10]. Therefore, finding the transmission support of the authenticated nodes, i.e., establishing a delayed transmission correlation function, is a basic premise. Based on the above theory, the approach proposed in this paper begins with a study of the delayed transfer relationship of the network. In establishing a delayed node transfer correlation function, the data transfer signal channels and signal sources in the network and the energy carrying level of each network node must first be clarified, and then, based on the energy level of each node, the residing coordinates of that node must be derived, so as to derive the energy consumed by that node during that sensing period and the transmitting distance, and finally, the transmission route constituted by the signal channels within the digital multimedia network is used to determine the transmission relationship of the data junction of this delayed network.

4. Optimization Method for Delay Cancellation of Digital Multimedia Network Communication

4.1. Communication Delay Optimization Based on Network Predictive Control Model. In a standard for multimedia network communication, the delay caused during the sending of data from a digital multimedia communication network comprises the sending time of the data transmitted by the server to the controller using the network and the time of the data transmission from the controller to the operator [11]. During multimedia network communication, it takes $T1$ time from sending to receiving, and if this network communication control centre works immediately after receiving the data of this communication, and there are multiple channels of communication data transmitted at the same moment, the work load of this multimedia network will increase. In the usual case of processing load, the communication delay of a job is fixed.

This multimedia network transmits a channel of data signals transmitted by this sensor in relation to the object of this communication setup, the data stream is considered by this network communication controller as a signal job, and the time required to analyse this single from data flow is as follows: P_i is the number of information contained in the received data information. Since spatial coordinates at multiple spatial locations are used and thus large deviations exist, errors in spatial matching must be compared to errors in the measurement of channel data [12]. After correcting the multimedia network for communication time errors, the covariance of the estimated bias in the target information increases due to the appearance of new errors. Also, due to the variable nature of the multimedia network communication data, the effect of its resource allocation varies across different data streams. On this basis, a novel nonlinear predictive control implemented using a fuzzy integrated model is proposed to achieve fast estimation of communication delay conditions in digital multimedia networks [13]. It is increasingly used in the prediction of digital media networks due to its adaptive nature to time lags, structures, and variables. Based on a controlled autoregressive-integral-slip-averaging model, a new communication control prediction vector is derived by converting a finite data flow problem into a quadratic programming problem using the optimal objective and optimal prediction results in digital media networks, thus reducing the data transmission delay of multimedia network communication. To eliminate the delay in the digital multimedia network space, the communication control prediction vector can be used to create a particle communication space composed of node particle swarm to constrain the control signal in the digital multimedia. The particle communication space can generate a communication space mapping strategy for the control signal constraint. The mapping strategy eliminates the delay in digital multimedia network communication by decomposing the execution part subarray and the data part subarray. This is shown in Figure 3.

4.2. Communication Delay Cancellation Based on Pseudolikelihood Estimation. By using a pseudolikelihood estimation method, the delay of a network can be estimated and its performance can be measured accurately. The method consists of the following steps. In network delay calculations, the network link matrix is usually of full rank and cannot be solved from the path conditions of the network links, i.e., the delay of the whole link cannot be calculated from the delay obtained by the receiver detector [14]. For this reason, the probability distribution of the network delay must be statistically estimated and a pseudolikelihood estimation method must be used to estimate the delay of the network. The problem of calculating the network delay is converted into a pseudolikelihood estimation and solved accordingly [15]. Initially, the paper computes the optimal number of network subclusters using the digital multimedia delay control network model. Subsequently, the network nodes are regulated based on their communication radius, and the energy consumption incurred by each node in the cluster is evaluated during any monitored data collection. Furthermore, the actual communication radius of each node is ascertained based on the node density, and the group size is adjusted accordingly to promote load balancing within the cluster. It is worth noting that the data delay distribution of various terminal nodes is independent, and the energy carried by the target node in the detection unit can offset the amount of data resources in the interactive network node. Additionally, the paper outlines a mechanism for selecting the optimal transmission path during the data transmission process, which aids in eliminating delays encountered in the multimedia communication network. The following steps are described in detail: the energy ET consumed by

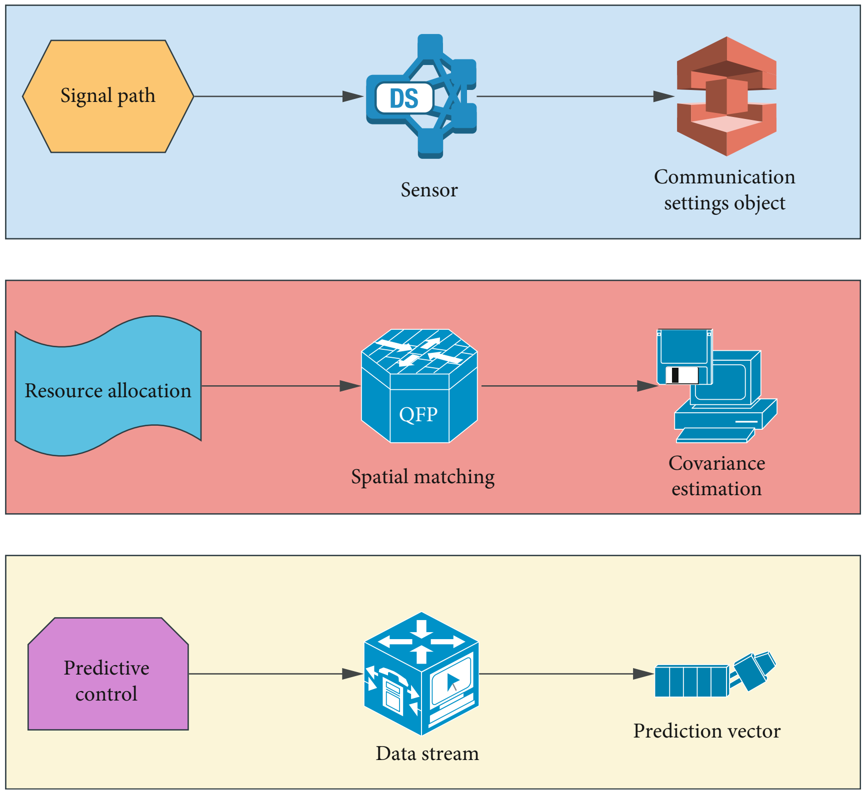

Figure 3: Communication prediction vector based on fuzzy synthesis model.

Table 3: Multimedia communication transmission delay factors.

The number of times a message was sent	Message processing rate	Message payload
More	Fast	Enlarge
High latency	Low latency	High latency

the transmitting node and the energy ER consumed by the said receiving node during communication.

$$\mathrm{ER} = \sum_{t=1}^{n} \mathrm{ET} + \frac{\sin}{\sqrt[3]{f(x) + \sin x}}. \tag{5}$$

According to the residual of communication energy and the distance of communication transmission in digital multimedia networks, the communication clusters in wireless networks are screened using specific distribution screening techniques, and the background search is performed using ant algorithms at the communication nodes in the clusters, and the minimum communication transmission energy is determined according to the minimum cost of clustering aggregation, so as to eliminate the communication delay in wireless networks. The maximum competitive radius of the cluster head node of class R is maximum, while the minimum distance between the network node and the signal transmission node can be determined by the transmission energy and the communication delay, and the diffusion radius of the wireless network node R can be calculated from the channel distance d and the diffusion radius cc as follows.

$$\begin{aligned} d &= \sum_{t=1}^{n} \left\| \sin \phi + \sqrt{f(x + \sin x)} \right\|, \\ \mathrm{cc} &= \frac{\iiint_{a=1E} g(t) \sin h \cdot \pi e}{\sin z + w(t) \cdot T}, \\ R &= \iint_{a=1} \frac{\beta}{\eta + \sin a} \cdot f(s), \end{aligned} \tag{6}$$

where the diffusion radius cc represents the transmission radius of the information disseminated during communication, the data of the nodes are found, the aggregation status of the nodes is judged, the distance between the nodes and the nodes and the remaining energy are calculated, and the initial communication data density is found [16]. According to the rate of change of information enhancement, the transmission path with the most remaining energy is derived as the largest, and its expression is as follows: z expresses the enhanced information density; s represents the alpha threshold of data transmission frequency; w represents the weighting factor of ant information quantity; T value represents the data concentration; g represents the maximum value of transmission delay, e represents the delay of packet fusion; h represents the average transmission speed of packet. In communication, the number of messages sent, the processing rate of messages, the frequency and duration of data

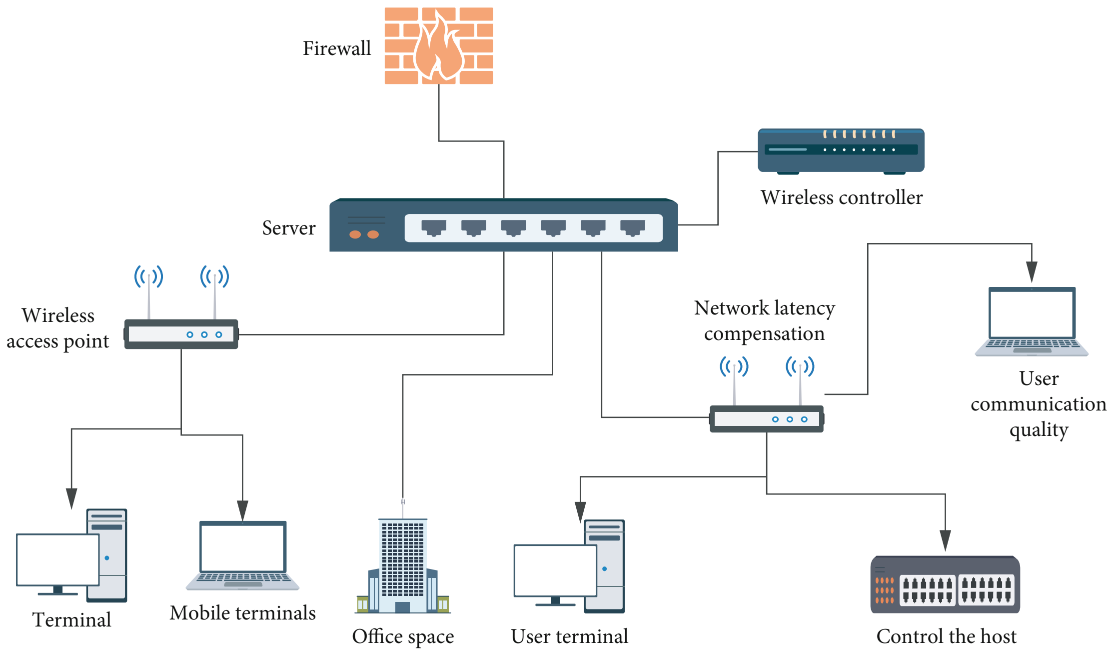

Figure 4: Network communication delay compensation architecture.

transmission, the increase of message load, the positive relationship of messages, and the real-time update of messages all reduce the delay of data transmission in multimedia communication networks, as shown in Table 3.

5. Analysis of Simulation Experimental Data

5.1. Delayed Compensation Establishment. The correctness of the method for network delay calculation was demonstrated by a delay compensation experiment. The experiment was simulated and programmed using MATLAB software during the trial [17]. The target coverage area of the network delay was set to be $2 \times 2, 4 \times 4, 6 \times 6$, as the larger the area covered by the network, the higher its complexity and hence its increasing complexity. When the network coverage area is 2×2, the traditional method combined with the network predictive control algorithm in the paper is used to obtain the network communication delay compensation architecture diagram shown in Figure 4.

When the network coverage area was 4×4, a combination of the traditional method and the method in this paper was used to obtain the data delay arithmetic error results. When the network coverage area is 6×6, the traditional method and the method in this paper were used to calculate the network delay, respectively, and the results of network delay data processing were obtained. Through the calculation of the three network coverage areas, it is found that when the network size is small, the estimation accuracy of the network delay using different algorithms is above 90% and has a high accuracy to accurately estimate the performance of the network. However, as the size of the network increases, its complexity also increases [18]. When the network scale is large, the correct rate of network delay calculation using traditional methods is about 80%, while the correct rate of network delay calculation using network predictive control methods is still above 90%. When the network scale reaches its maximum, the accuracy of the network delay calculation using the traditional method is only 75%, while the accuracy of the delay calculation using the intelligent algorithm method reaches 90%, which illustrates the superiority of the method in the network delay calculation. To further demonstrate the advantages of the proposed method in network delay calculation, 10 target areas were selected for simulation. By collating and analysing the experimental data, Table 4 can be derived.

Table 4: Simulation test data.

Traditional methods	90%	80%
Intelligent algorithms	70%	75%
Network control model	90%	80%

From the above experimental data, it can be seen that under the conditions of high network complexity, the method of this paper can be used to obtain more accurate results than conventional methods, thus greatly improving the calculation accuracy of network delay. Based on the predictive control of communication in digital multimedia networks, it is divided into different communication tasks, which are implemented by using the method of balanced loading, and the Min–Min algorithm is used to achieve the control of network communication, thus effectively solving the problem of time delay in the network [19]. In order to solve the communication delay in digital multimedia networks, the T communication tasks must be reasonably divided into N communication channels, and BJC is an $m * n$ matrix that represents the minimum time completed by each communication task in different channels. The BJC matrix is divided into two types, TH and TL, according to the nature of the communication task. The TH matrix contains communication tasks with the highest degree of secrecy and a total of m lines; the matrix TL contains communication tasks with a lower degree of secrecy consisting of $m1 + m2 = m$.

Table 5: Calculation weights for communication delay.

TJ	SZ	HD	CJ	SY	PJ
20%	40%	80%	17%	10%	22%
50%	60%	70%	20%	20%	28%

5.2. Simulation Results of Communication Delay Cancellation in Digital Multimedia Network. In order to test the overall effectiveness of the algorithm, the prediction of the communication delay of the system had to be implemented through the Simulink platform. rj denotes a control weighting sequence, which is generally used as a constant in the interval [0, 10], and the larger the value of rj, the higher the prediction accuracy of the network communication condition. By comparing the three methods, the prediction accuracy of the three methods on the network communication condition is compared and the corresponding experimental results are given.

Using an optimization approach, the energy of the nodes of the single-hop road network was calculated, divided into a grid of equal size, the residency state of the largest communication node in the convergent single-hop network was determined, and the network coverage in the residency state was analysed to obtain the distance from the sensor node to the signal, and a model of the balanced network cycle and the movement path of the convergent node was developed and combined with the ant algorithm to propose a strategy to eliminate communication delays [20]. The energy of a node will change from a low-energy node to a maximum when the energy of the sensing node is remaining, so it must be analysed for energy. Using the path node spacing as a threshold, the different energy levels are divided, the corresponding grid centres are established, the largest communication node is the resident indicator symbol in a data cycle, and the stay status is determined based on the number of resident nodes. The ratio of the energy on the transmission node to the energy remaining per unit time is the energy required to transmit to the destination. On this basis, the correspondence between node and transmission distance is derived by using the coverage area of the cluster head node of the wireless communication network and weighting each cluster head interval. A power consumption input feedback equalisation model based on the cluster head coverage radius as a signal is used to obtain the output signal of the system.

In Table 5, TJ denotes a series of control weights; SZ denotes a method for fast communication delay elimination in digital multimedia networks; HD denotes a method for network communication delay elimination using chaos principles; CJ denotes a distance-based network transmission delay elimination; SY denotes the number of iterations; and PJ denotes the average value of a parameter. By analysing the data in Table 5, it can be seen that the fast communication delay elimination using digital multimedia networks reached an average value of 5.5 for the parameter; the maximum average error of 4.8 was obtained for the network delay elimination using the chaos principle; and the distance-based network communication delay elimination method was used to obtain a form of 5.8. Through the comparison of the three methods, it is found that the maximum average parameter can be obtained by using the fast communication delay elimination method, and the simulation experiment proves that the method has high prediction accuracy.

5.3. Results of Data Analysis. Through the study of digital multimedia network, it is found that its transmission delay is less than 300 milliseconds, which has no effect on network communication and normal operation. On this basis, the three methods of communication delay cancellation are compared and the three methods of delay cancellation in the network are given.

Figure 5 shows the experimental results obtained with the method of quickly eliminating communication delays in digital multimedia networks, and the analysis of Figure 5 shows that the method can achieve the control of communication delays in digital multimedia networks within 300 ms and has a more stable communication delay. With the continuous increase of the number of nodes, the number of network nodes in the communication network N ranges from 5 to 200. When the number of nodes in the wireless network N is small, the impact of a value on the life cycle of the communication network is more obvious. After many experiments, the obtained value is between 2 and 3, which is the best and can minimize the network communication delay.

Figure 6 shows the experimental results of network communication delay elimination based on chaos principle. The larger the channel radius, the smaller the amount of data undertaken by each node in the whole wireless network communication process. If $r = R$, the data packet undertaken by each node in the communication process is 1. It shows that only its own data is included. The smaller the amount of communication data, the smaller the time required for each node in the whole network to convert, and thus, the delay is reduced. Figure 7 shows the ranging technology. By adjusting the communication radius of the network node to control the size of the wireless network cluster, there is less data backlog on the communication link, which improves the network communication rate. The network communication delay cancellation method based on ranging technology can still effectively eliminate the communication delay of digital multimedia network with the increasing number of requests. By analysing Figures 6 and 7, it can be seen that the network communication delay cannot be made less than 300/ms when using the above two methods to control network communication, and the communication delay is unstable. By comparing the three methods, it is found that the communication delay in a digital multimedia network

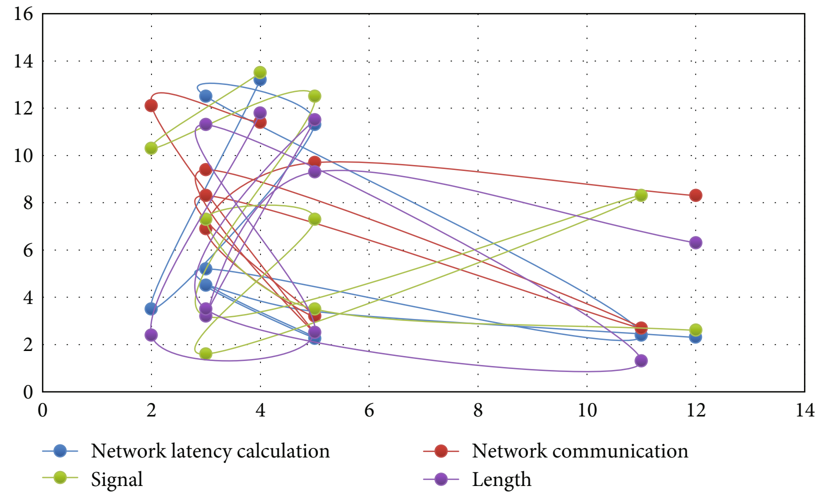

Figure 5: Test results of rapid elimination of network communication delay.

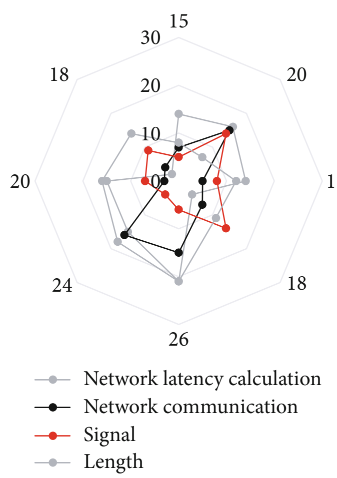

Figure 6: Network delay elimination test results based on chaos principle.

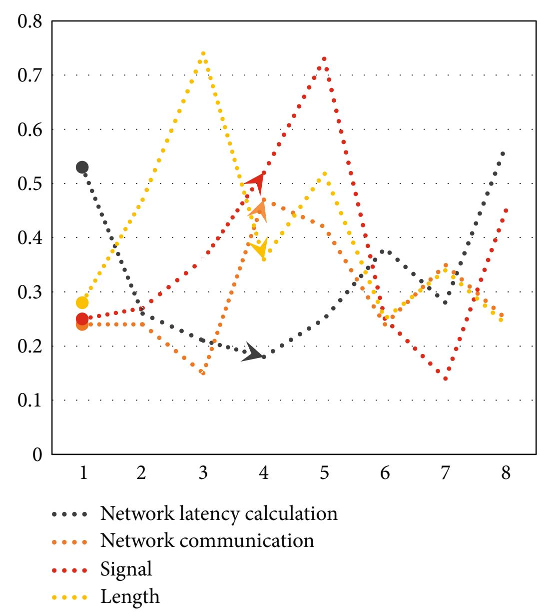

Figure 7: Network delay elimination test results based on ranging technology.

can be effectively eliminated by using a fast communication delay elimination method. In digital multimedia networks, the rapid growth of data volume tends to cause network data congestion, which leads to transmission delays in the network. Using existing network communication delay elimination techniques, the traditional network transmission delay can be eliminated, thus avoiding the impact on network communication. This paper introduces a technique that can effectively predict the communication conditions in a digital multimedia network and control the digital multimedia network communication delay within 300 ms, thus effectively improving the speed and accuracy of data transmission.

6. Summary

Communication latency is a common problem in large-scale multimedia network devices, especially when the number of channels is small or when the data stream reaches its peak. On this basis, a linear transformation method based on wavelet analysis has been used to solve for the state parameters of the network, providing a solid theoretical basis for the calculation of the delay of the network. The method is simulated and analysed using a pseudolikelihood estimation method. The tests prove that the method can provide an effective estimation of the delay of the network under the conditions of large network scale and high network complexity, so as to better represent the delay of the network. Based on this, a new network transmission delay offsetting mechanism for network forecast control is adopted, and delay correction is applied through it. It is demonstrated experimentally that the modelling of the network communication delay offsetter can be used to compensate for large-scale multimedia network transmission delays, thereby overcoming the negative effects on system performance due to communication delays.

Data Availability

The labeled data set used to support the findings of this study is available from the corresponding author upon request.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

Authors' Contributions

Jinxia Li contributed to the writing of the manuscript and data analysis. Liwei Lu supervised the work and designed the study. All unanimously agreed to the above arrangement. All the authors have read and agreed with the final version to be published.

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