Wireless Sensor Communication Link Optimization Based on Quantitative Analysis of Cloud Computing

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Abstract: the Abnormal Behavior Detection and Evaluation Standards for Wireless Sensor Network Nodes May Lead to Inconsistency, Packet Loss and Malicious Attack Delay. a Communication Link Optimization Strategy Based on the Quantitative Analysis of Random and Floating Cloud Computing is Proposed. Quantitative Analytical Monitoring Interaction of Adjacent Random and Asymmetric Cloud Computing, Calculation of Direct and Indirect Trust Values of Data Sent by Each Sending Node, Data Communication Process, in Order to Optimize the General Trust Values Generated by Synthesis Rules. in the Simulation Experiment, the Optimization Strategy is Useful, There Are Malicious Data Fast and Effective Data, Wireless Communication Efficiency, Energy Saving, Large-Scale Data Transmission and Stable Convergence and Accuracy Can Be Identified, Which Can Be Guaranteed.

1. Introduction

The Communication Link Data Transmission in Wireless Sensor Network is an Important Module and Functional Structure of the Whole Wireless Sensor Network, and It is an Important Part of the Energy Consumption of Wireless Sensor Network. in This Process, Data Transmission Error, Packet Loss and Error and Other Problems. At This Time, Lu Lintao et al. a Secure Routing Algorithm Based on the Reliability of Wireless Sensor Networks is Proposed. the Hierarchical Trust Model is Used to Establish a Secure Path, Eliminate Malicious Nodes, and Improve the Efficiency of Data Distribution. an Algorithm Based on the Confidence Value of Adjacent Nodes is Proposed. Each Node Itself is Clustered Based on the Obtained Confidence Value [1]. the Nodes of the Cluster Send Data to the Trusted Cluster Head Nodes to Realize Data Mixing and to Enhance Data Transmission to a Certain Extent. in Addition, in Addition to Yang Gang and Yin Guisheng, an Evaluation Model Based on Tp Brsn is Proposed to Evaluate the Transmission Data of Ma &Amp; Wireless Sensor Network Nodes, and the Reliability of Nodes and Data Packets is Proposed during the Integration. Optimize the Release Plan. However, the Detection and Evaluation Criteria for Abnormal Behavior of Wireless Sensor Network Nodes Are Fuzzy and Single [2]. the Data of Each Node in Wireless Sensor Network Cannot Be Effectively Coupled. It is Difficult to Control the Random and Jumping of Nodes in Real-Time Changing Environment. the Distribution of Malicious Nodes, Packet Loss, and Delay in Malicious Attacks Are Serious Threats to the Data Transmission Security of the Whole Wireless Sensor Network System. in Order to Solve This Problem, a Communication Link Optimization Strategy Based on the Quantitative Analysis of Random Floating Cloud Computing is Proposed [3]. the Proposed Wireless Sensor Network Can Effectively Save the Energy Consumption of Wireless Network Nodes and Greatly Improve the Accuracy of Data Transmission and Distribution.

2. Data Distribution Trust Value Calculation

Based on the Guidance and Optimization Design of Wireless Sensor Network Communication Data Transmission and Communication Link in Cloud Computing Environment, This Paper Makes a Quantitative Analysis of the Adjacent Random and [4]. Monitor the Mutual Actions of Nodes, Calculate the Direct Trust Value and Indirect Trust Value of Each Sending Node in the Data Distribution, Generate the Comprehensive Trust Value According to the Synthesis Rules, and

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Optimize the Data Distribution Process.

The Direct Trust of the Wireless Sensor Network Communication Link Data Distribution Node I to the Neighbor Node J is Described as Follows: the Trust Relationship is Expressed by Four Tuples (E_i, E_j, d, t) Where Are the Entities, d Are the Interactive Data, and t is the Interaction Time.

$$D = \{S_{i,j}(t), T_{i,j}, U_{i,j}(t)\} \tag{1}$$

Where $S_{i,j}(t)$ T represents data repetition factor, $T_{i,j}(t)$ T represents data output factor, $U_{i,j}(t)$ represents data similarity (correlation), and the calculation formula is as follows:

$$S_{i,j}(t) = \frac{P_{i,j} - sp_{i,j}(t)}{p_{i,j}(t)} \tag{2}$$

Among them, $P_{i,j}(t)$ is the number of data output at time T, $sp_{i,j}(t)$ t is the number of data repetition, $\Delta p(t)$ is the dynamic reference value of data number, $z_i(t), z_j(t)$ are the output of each monitoring value respectively, and B is the comparison coefficient.

In different application fields and practical needs, the above three factors account for different proportion in data fusion [5]. To avoid the single function of trust model, comprehensive trade-off is needed. In this paper, weighted average method is used to achieve this trade-off.

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$$D = DW \tag{3}$$

After connecting the message, the node itself d = DW, the trust of wireless sensor network initialization time, so the interaction of each node's data does not have the initial value.

Therefore, there is no initial value node during the real-time update of wireless sensor network. The trust value obtained in the latest time is 1, and the longer the interval, the smaller the effect on the current of the trust value:

$$D_{i,j}(t_{n+1}) = \frac{D_{i,j}(t+1) + f(n)D_{i,j}(t_n)}{2} \tag{4}$$

There is an update period Δt between the time of t_{n+1} and the time of TN, that is, the direct trust value of node data distribution is the average value of the trust value of the previous period and the current one after the decay of the trust value. The time weakening function $f(t)$ not only ensures the continuity of the calculation of the trust value of packet distribution, but also adjusts the proportion of the trust value of the previous period. This calculation method can guarantee the maximum of the trust value Timeliness.

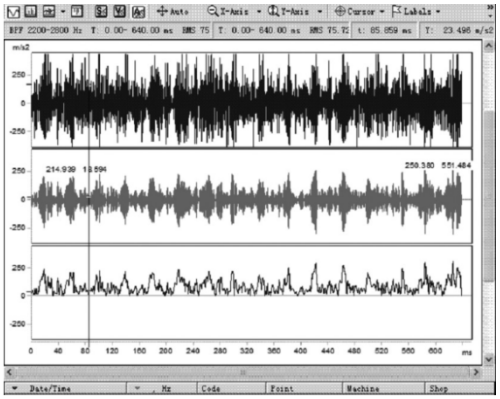

Fig.1 Simulation Results of Data Distribution and Filtering Identification

In order to evaluate the behavior of node j comprehensively and accurately, node i requests other neighbor nodes of node j to send their own direct trust value to node j, and then synthesizes the indirect trust value of node i to node j according to the synthesis rule, which is set as vector I.

If node K is one of the other neighbor nodes of node j, then the indirect trust value I of node i to node j at time t can be calculated by the following formula: $I_{i,j}(t) = \frac{\sum D_{i,k}(t) D_{k,j}(t)}{\sum D_{i,k}(t)}$

When one entity evaluates the trust of another entity, the weight of direct trust is λ, and the weight of indirect trust is 1 - λ. Therefore, the comprehensive trust Ω can be expressed as:

$$\Omega = \lambda D + (1-\lambda) I \tag{5}$$

If node K is one of the other neighbor nodes of node j, then the indirect trust value I of node i to node j at time t can be calculated by the following formula:

$$\Omega = \lambda D + \frac{1}{n} \sum_{i \in Q} I_{i,j} \tag{6}$$

Where q is the set of neighbor nodes of node j and N is the number of entity nodes in the set.

3. Data Fusion Communication Transmission under Cloud Model

In the wireless sensor communication link data communication transmission, based on the reliability of the above design data transmission, the requirements of random trust and comprehensive trust value using quantitative analysis, the wireless fusion construction of node intersection monitoring [7]. Communication mode, processing large amount of data, improving processing speed, reducing the energy consumption of wireless sensor network. Fig. 1 shows matters related to wireless sensor network communication links in a cloud environment. In order to improve the cloud processing performance of data, a large number of data are compressed to reduce the amount of data and the pressure of communication and storage [8]. N data at time t, x n (n = 1,2 Assuming that n) needs to be allocated in the communication link of wireless sensor network, then a segmented design is defined. The data sequence x is sliced into several sub data strings according to the given error ε, and is effectively compressed under the premise of ensuring the data accuracy.

Where id M represents the sequence number of the first data in sub segment M. The data sequence x is divided into several sub data sequences according to the given error ε, and the data is compressed effectively on the premise of ensuring the data accuracy [9].

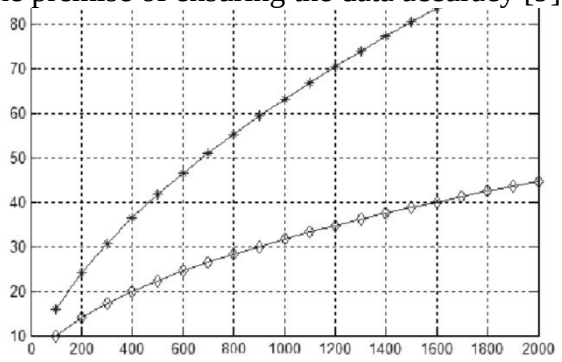

Fig.2 Energy Consumption Analysis Results

4. Simulation Experiment and Result Analysis

In the simulation experiment, the simulation design of data transmission process of wireless sensor network communication chain is realized by MATLAB programming. Choose a cloud computing platform based on Hadoop HDFS. The cloud computing platform is Hadoop 0.20.2. The management node 19 calculates nodes. The management node is responsible for processing data analysis, upload and node management, and calculating nodes for other nodes. The sensor node is

set as 100, randomly distributed in a 100m × 100m rectangular area, and the communication radius of the node is 10m. Optimize the data transmission process. Effective data and malicious data can be identified quickly and effectively through optimization strategy [10]. It should be noted that in Figure 2, the simulation is in the center and the upper part is the original transmission data. Identify malicious data immediately after the system process. And, as shown in the center waveform, useful distribution data is obtained. The lower waveform is filtered out of malicious data. It effectively improves the wireless sensor network communication chain [11].

5. Conclusion

This paper discusses the optimization of communication data link of wireless communication network in cloud computing environment, and analyzes the communication and data transmission of wireless sensor network. A wireless analysis based on the quantitative analysis of random and floating cloud computing is proposed. The sensor communication link is used to compare energy consumption effects. Under the same conditions, the traditional wireless sensor network communication link design method and the method of the invention are used to obtain the energy consumption simulation analysis diagram of the wireless sensor network. The results show that under the same data transmission and transmission, the power consumption is greatly reduced and the survivability of wireless sensor network is guaranteed. Through the design of optimization model and algorithm to identify useful and malicious data, calculate the set confidence value of adjacent sensor node data in each adjacent area, and optimize the data distribution process. The algorithm effectively and quickly identifies data attributes, manages and filters shadows. In the process of integrated development of cloud computing, wireless sensor can greatly reduce energy consumption in the process of data transmission and distribution. Ensure the security and legitimacy of efficiency, large-scale data transmission and convergence.

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