Layered Encryption Method for Monitoring Network User Data for Big Data Analysis

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Abstract. The conventional monitoring network user data layered encryption method had a low security when layered encryption of modern network data. Therefore, a layered encryption method for monitoring network user data for big data analysis was proposed. Big data technology was introduced, and a layered framework of network user data was built to monitor and encrypt network user data. Relying on the determination and layering of different levels of user data, the data layered encryption model was embedded to realize the layering and encryption of monitoring network user data. The test data showed that the proposed layered encryption method for monitoring network user data for big data analysis would improve the security of the data by 46.82%, which was suitable for users of different levels to encrypt their own network data.

Keywords: Big data analysis · Network users · Data layering · Network data

1 Introduction

Network layering is the process of sending or forwarding, packing or unpacking data to be completed by network nodes, loading or unloading control information, and different hardware and software modules. This can make the complicated problem of communication and network interconnection easier. The OSI model is divided into seven layers. From top to bottom, the application layer refers to the network operating system and specific applications. Corresponding server, FTP server and other application software represent layer data syntax conversion, data transmission and other session layers establish a conversation relationship between the two ends, and responsible for the data transmission layer is responsible for the error check and repair to ensure the quality of the transmission, is where TCP works. The network layer provides an addressing scheme, where the IP protocol works (data packet). The data link layer wraps the unprocessed bit data transmitted by the physical layer into physical devices such as network cables, network cards, and interfaces of the physical layer of the data frame.

Literature [1] proposed an efficient hierarchical data encryption method based on cognitive radio network, constructed the framework of markov decision process, based on remote sensing results and residual energy, and combined with private key

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encryption method, realized the hierarchical encryption method of big data analysis. However, the accuracy of the method is poor and the application effect is not ideal. Literature [2] proposes a joint data stratification and encryption method based on wireless energy audit network, which completes the stratification and encryption of big data analysis by taking advantage of the compression and encryption characteristics of compressed sensing and combining with the reconstruction mechanism based on machine learning. However, this method is too simple and has limited application.

In order to solve the problems of traditional methods, a hierarchical encryption method is proposed to monitor network user data for big data analysis. Better implementation of network data encryption, and improve the security of data.

2 Construction of Hierarchical Data Encryption Method for Monitoring Network User Data in Big Data Analysis

Symmetric encryption is the same key used for encryption and decryption, representing the algorithm AES, DES. This encryption mode has a big disadvantage: it is assumed that the information is transmitted by Party A to Party B. If Party A uses the key for encryption, then it must find a way to tell the party to the key. How to save and transfer keys has become a very troublesome thing.

2.1 Introduction of Big Data Technology

After establishing a TCP connection, the server transmits the response HTML to the client through a TCP packet through the TCP protocol. The network layer of the client reorders the received TCP packets, adjusts them, and hands them over to the application layer. At this point, the HTTP request is completed. With the popularity of scalable video coding, security issues for scalable video have also received increasing attention. Most of the current encryption schemes are for H. Designed by the 264/AVC coding standard. The new technology adopted by SVC is analyzed, and a new layered encryption scheme based on its characteristics is proposed. The scheme selects different key information of the previous video, such as inter-layer prediction motion vector, quality scalable key frame, etc. as the encryption object, and performs algorithm design according to the type of selected information and the security level required by the user. The experimental results show that the scheme has the advantages of good encryption effect, low key quantity and high real-time performance, and can adapt to the application of different security requirements [3] (Fig. 1).

The physical layer is the lowest layer of the reference model. This layer is a data transmission medium for network communication, consisting of a cable and devices connected to different nodes. The main function is to use the transmission medium to provide physical connection for the data link layer, which is responsible for processing data transmission and monitoring data error rate, and achieving transparent transmission of data streams [4].

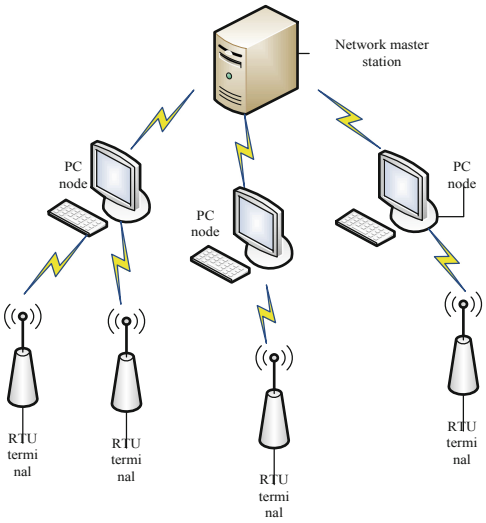

Fig. 1. Network data layering system

2.2 Building a Network User Database Framework

The hierarchical encryption method for network user data seems to be very simple. However, certain aspects of this layer sometimes require special attention. The physical layer is actually wiring, fiber, network cards, and other things that connect two network communication devices together. The elimination of network failures often involves a layer of problems. We can't forget the legendary story of connecting five levels of lines across the entire floor. Since the office chairs are often pressed from the cable, the network connection is intermittent. Unfortunately, this type of failure is very common, and it takes a long time to eliminate such a failure [5]. Currently, it is only necessary to know that the second layer converts the data frame into a binary bit for one layer of processing [6] (Fig. 2).

The application of layered encryption method for monitoring network user data for big data analysis realizes the construction of networked data layered encryption system under the background of big data.

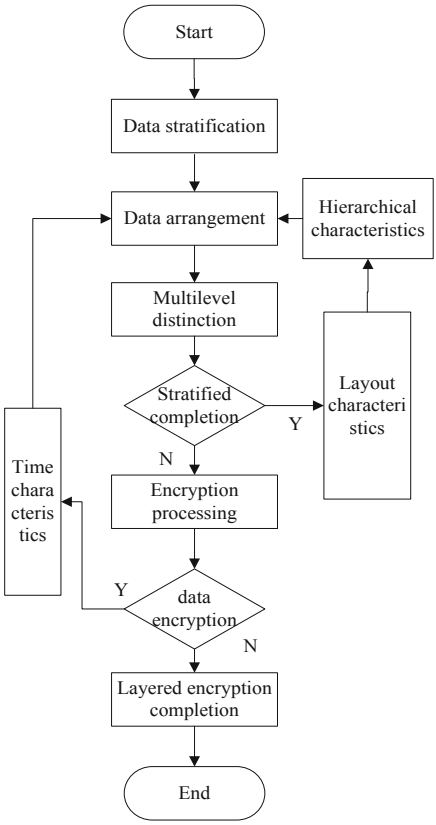

Fig. 2. Data layered encryption flow chart

3 Analysis of Hierarchical Encryption Method for Monitoring Network User Data Under Big Data Analysis

Hubs belong to the first tier because they are just electronic devices and have no knowledge of the second tier. The second level of related issues has its own part in this webinar. Therefore, the details of this issue will not be discussed in detail at present. Cognitive wireless network technology with characteristics of cognition, autonomy and variability, as an important technology to improve the capacity of wireless networks, has attracted the attention of academic circles, standards organizations and industry [7]. Aiming at the fact that existing power control technology can not describe the hierarchical decision-making of multiple cognitive nodes, a multi-user dynamic layered power control algorithm in cognitive wireless networks is proposed [8] (Fig. 3).

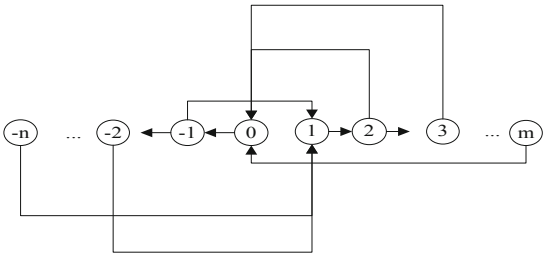

Fig. 3. Data layering diagram

Based on the proposed Stall Kohlberg capacity maximization game model, a distributed power control method is designed for multiple users with cognitive information asymmetry in cognitive wireless networks. Multi-stage dynamic interaction between leader users and follower users ia achieved, and overall network performance is achieved while ensuring individual utility (Table 1).

Table 1. Working mode of network layered model.

Client	The server
Application layer	Application layer
Transport layer	Transport layer
Network layer	Network layer
Data link layer	Data link layer
Physical layer	Physical layer

The bridge works on the second layer and only focuses on the MAC address on the Ethernet. If you are talking about MAC addresses, switches or network cards and drivers, it is in the second layer. The specific situation is shown in Fig. 4.

Big data is a research hotspot in the current academic and industrial circles, and it is affecting people's daily life patterns, work habits and thinking patterns. However, at present, big data is faced with many security risks in the process of collection, storage and use. Privacy leakage caused by big data causes serious trouble to users, and false data will lead to wrong or invalid big data analysis results. The data analysis has the following formula:

$$z = (x - \overline{x})/s \tag{1}$$

Among them, s is the standard deviation. For the technical challenges of massive computational analysis and complex cognitive reasoning in big data computing, traditional computer-based algorithms can not meet the increasingly demanding data processing requirements. The group computing based on human-machine collaboration is an effective solution. The size of Internet users is shown in Table 2:

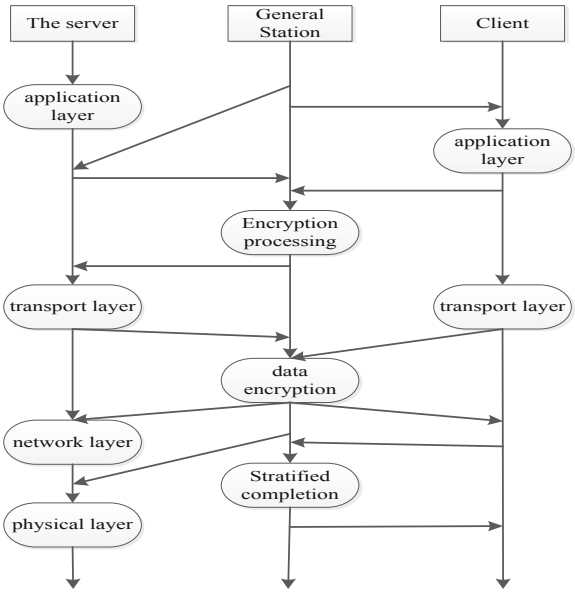

Fig. 4. Network user data layered framework

Table 2. Comparison of internet user size.

Project	2010	2011
Micro-blog	63110000	249880000
Space	294500000	319850000
Instant messaging	352580000	415800000
E-mail	249690000	245770000

The inherent complexity of large data problems, high-speed growth, form diversity, and low value density pose serious challenges for traditional computing methods. On the one hand, the large-scale and high-speed growth of big data brings the demand for massive computational analysis. On the other hand, the characteristics of form diversity and low value density make big data computing tasks highly dependent on complex cognitive reasoning techniques (Fig. 5).

The rapidly evolving Internet has become an indispensable part of people's lives, and people have left many data footprints on the web. These data footprints are cumulative and relevant, and when multiple data footprints are brought together, individual privacy information can be discovered. It brings a lot of trouble or economic loss to the individual's life. The network traffic ratio is expressed as the following formula:

$$M = \sum ap \tag{2}$$

$$p \leq \frac{(t+a)(t+a+1)}{2} \tag{3}$$

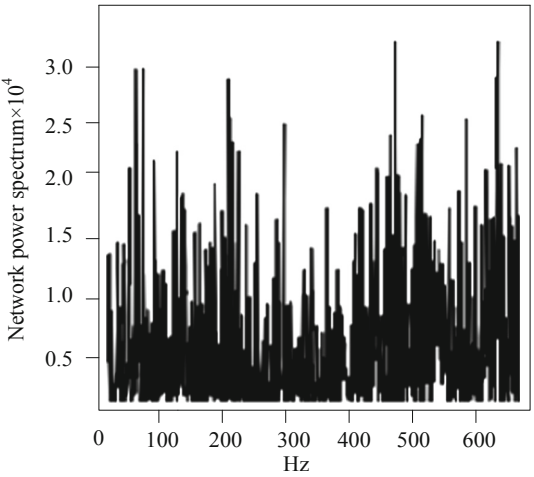

Fig. 5. Schematic diagram of the impact of network user data stratification

Among them, a certain network access amount is a, and the first access amount is p. With the development of smart grid, communication network technology and sensor technology, data on the power user side has increased exponentially and complexity, and gradually formed user-side big data. The traditional data analysis mode can no longer meet the demand, and it is urgent to solve the problem of analysis and processing of big data on the power user side. Analyze the source of user big data, and focus on the large amount of data, large variety and fast speed of user-side big data, pointing out the challenges faced by network users in big data in terms of data storage, availability, and processing. The embedding process is shown in Fig. 6.

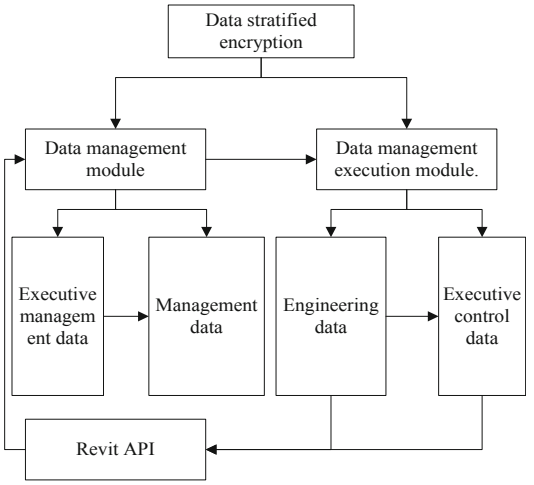

Fig. 6. Data layered encryption method implementation process

With the development of information technology, emerging services such as blogs, Weibo, and social networks based on new technologies and the Internet of Things have produced unprecedented types of data at an unprecedented rate. Cloud computing provides a basic platform for data storage, which has brought about the official arrival of the era of big data. Big data contains great value and is a valuable asset of the company. But big data also brings huge challenges.

4 Simulation Experiment

In order to ensure the effectiveness of the modeling and analysis of the hierarchical network encryption method for monitoring network user data proposed in this paper, simulation analysis is carried out. Different methods are used to conduct data layered encryption for network users as test objects, and the analysis accuracy simulation test is carried out. The network user data layered encryption method is simulated. In order to ensure the validity of the test, the previous method was used as the test comparison object to carry out the simulation test.

4.1 Test Data Preparation

Layered encryption of network user data is based on the direction of the general direction. You want users to work toward what core goals, and users grouping them is to split them into finer granularity. The two are complementary. According to the 28th rule, 80% of the product's revenue is contributed by 20% of users. In this way, our core users are actually not many. How do we find them, how to use the value of other traffic, how to train more users to become core users, to achieve these goals, and to achieve a cultured operation.

4.2 Analysis of Test Results

During the test, two different methods were used to layer the network user data at the same time, and the accuracy rate was analyzed. In order to ensure the accuracy of data processing, the hierarchical data encryption of network users is monitored by means of big data analysis. The statistical results of the results are obtained and the test results are obtained. The simulation accuracy curve is shown in Fig. 7.

According to the results of the test curve, it is possible to realize network data layering by LSI. Experimental data show that the data stratification encryption time of the proposed method is always lower than that of the traditional method under different experiment times, with the maximum difference of 50 min. The shorter the time, the higher the efficiency of the method, which proves that the method in this paper is more suitable for data stratification in all walks of life. This is because the method in this paper constructs a layered network user data framework, and at the same time, combined with embedded data layered encryption model, can effectively improve the efficiency of monitoring and encrypting network user data, and better realize the hierarchical encryption of monitoring network user data.

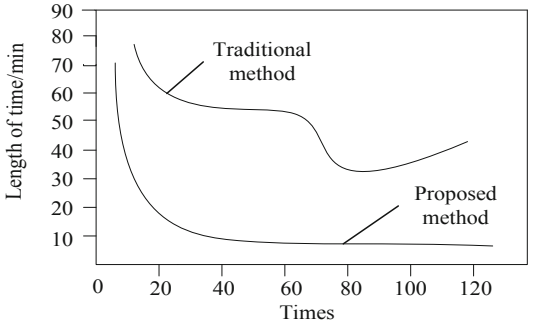

Fig. 7. Layered encryption method effectiveness simulation curve

5 Conclusions

Under this structure, the core users of the network, both in the direction of content production and in the direction of consumption, represent two types of operational strategies. User layering of the dual pyramid structure is not uncommon. User layering, generally four or five layers of structure can be, too much layering will become complex, not suitable for the implementation of operational strategies. User tiering is a top-down structure, but the user community cannot be fully summarized by structure. If you continue to increase the number of layers, the conditions will become complicated and the business needs will not be solved. So we use a horizontal structure of user grouping. Groups within the same tier continue to be segmented to meet higher refinement needs.

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