Discussion on Network Security of Information Retrieval Technology in Network Communication

Qiang Zhang\textsuperscript{1,*} and Dehui Ma\textsuperscript{1}

\textsuperscript{1}Shandong Yellow River Information Center, Jinan, Shandong, China, 250013

*Corresponding author e-mail: zhangqing@yrcc.gov.cn

Abstract. Network communication has become an important tool to ensure the efficient operation of modern society. The retrieval of network communication information is mainly based on the annotation and extraction of information characteristics in network communication, so as to carry out retrieval matching. The key of its application is to organize the information organically. Network communication information retrieval is not only a fast and effective way to obtain the required information, but also has important research value and role for the security of network communication. Based on this, this paper first analyses the information retrieval technology and network security technology in network communication, and then gives the practical application and development trend of the retrieval technology in network communication.

Keywords: Network Security, Information Retrieval Technology, Network Communication

1. Introduction
With the continuous iterative development of computer technology, network computing model is becoming more and more complex and large-scale. The current research on information retrieval technology in network communication focuses on several typical features as shown in Figure 1. Network communication includes unstructured, structured and other types, so its storage and retrieval should also have a variety of forms, and take reliable retrieval means to ensure the security and reliability of computer communication network. This requires to strengthen the application of information retrieval technology in computer communication technology on the basis of full recognition of network security protocol function.
At present, the application of information retrieval technology in network communication still has a large space for improvement and potential improvement, which is mainly due to the influence of various changing conditions and factors such as diverse formats and complex channel environment encountered in network communication information retrieval. These factors bring great challenges to the network security of information retrieval technology in network communication. Information retrieval in network communication mainly includes the storage and retrieval of information. At the storage level, it is mainly to lay the foundation for information retrieval and is also a necessary step before network retrieval. Therefore, the relationship between the two is interdependent.

On the other hand, the essence of network information storage is to organize the network communication information organically, and the retrieval of network communication information is mainly based on the annotation and extraction of the characteristics of network communication information, so as to search and match. It can be seen that the key of information retrieval technology in network communication is the organic arrangement of information, which needs to be carried out under certain rules and methods, so as to realize the construction of key steps and processes of several aspects of network communication information as shown in Figure 2.

![Diagram](image)

**Figure 2.** Key steps and processes of network communication information.

In addition, the information retrieval in network communication letters needs to be carried out under the unified retrieval language and specification, so as to realize the organic matching and efficient implementation of the content. Through the collection and analysis of a large number of scattered and disorder information, and then the information is recorded and stored organically, so as to construct an efficient retrieval system. Based on the requirements of communication information retrieval, the information feature identification is organically matched and compared, so as to make the final judgment. In short, the retrieval of network communication information is not only a fast and effective way to obtain the required information, but also has an important value and role for the security of network communication, which is mainly reflected in that the retrieval of network communication information can effectively improve the concept and awareness of network information security, and promote the efficient development of network security work. Therefore, it is of great practical value to study the network security of information retrieval technology in network communication.

2. Information retrieval technology and network security technology in network communication
2.1. Information retrieval technology in network communication

Information retrieval technology in network communication is based on the information resources in computer network communication[2]. It records and expresses a variety of communication information resources in digital form to realize distributed storage in network computer storage medium, so as to obtain valuable network communication information and content.

2.1.1. Information retrieval tools in network communication

Information retrieval tools in network communication mainly include web information retrieval tools and non-web information retrieval tools. Among them, the former mainly includes topic guide and search engine, while the latter mainly includes FTP retrieval tools, telnet retrieval tools and menu-based retrieval tools. The characteristics of these tools are shown in Table 1.

**Table 1. Key characteristics of information retrieval tools.**

| Tools                  | Sub-tools        | Characteristics                                      |
|------------------------|------------------|-----------------------------------------------------|
| Web information revival| Topic guide      | Suitable for topic browsing and retrieval           |
|                        | Search engines   | wide range of retrieval, large amount of information and fast update speed |
| Non-web information revival | FTP class retrieval | Online search tool for resources                  |
|                        | Telnet class     | Terminal of remote computer                        |
|                        | Menu style       | Interactive and menu information inquiry tool       |

2.1.2. Information retrieval engine

Information retrieval search engine is a tool for network communication information collection, information organization and information retrieval. It is mainly composed of search, index, retrieval and interface. Its architecture and working principle are shown in Figure 3 below.

![Figure 3. Architecture and working principle of information retrieval search engine.](image)

Based on the difference of classification methods, information retrieval search engines in current network communication can be divided into directory search engine, full-text search engine, independent search engine, meta search engine, comprehensive search engine, thematic search engine, monolingual search engine and multilingual search engine[3]. The typical characteristics of these different search engines are shown in table 2 below.
Table 2. Key characteristics of different search engines.

| Classifications | Search engines                     | Characteristics                                      |
|-----------------|-----------------------------------|------------------------------------------------------|
| Index mode      | Directory search engine           | Automatic collection of information for index building|
|                 | Full text search engine           |                                                      |
| Search mechanism| Independent search engine         | Feedback the corresponding query information or link site|
|                 | Meta search engine                |                                                      |
| Record range    | Comprehensive search engine       | Covers multiple topics and information types         |
|                 | Thematic search engine            |                                                      |
| Language classification | Monolingual search engine   | The search results are displayed in the corresponding languages|
|                 | Multilingual search engine        |                                                      |

2.2. Network security technology
With the continuous popularization and deepening of the application of computer network communication technology, how to face the increasingly severe form of network security has become the focus and research difficulty of information retrieval in current network communication. Due to the development of network system, it is inevitable that it has its own vulnerability, so we need to comprehensively use a variety of security technology to deal with network security threats, so as to ensure the effective and stable operation of various applications and services of network communication.

2.2.1. Influencing factors of network security.
At present, the network security factors in network communication mainly include human factors and operational errors, among which human factors mainly include various malicious attacks and hackers' invasion, which mainly based on scanning, breaking through, obtaining management rights, data theft, leaving backdoor programs, cleaning traces and so on, which constitute a real threat to network security[4]. At present, human factors have become one of the important factors affecting network security, especially information retrieval security in network communication.

2.2.2. Network communication security architecture
The network security architecture mainly includes several aspects as shown in Figure 4 below. Through the isolation and access control of different network security domains, network security detection, audit and monitoring, network anti-virus and network backup, the security system of information retrieval in network communication is constituted. In addition, based on the security configuration of the operating system, improve the security of the system, establish a secure system platform, and constantly discover and repair vulnerabilities to improve the security of the system. Network equipment regularly evaluates the network security through professional security tools, so as to ensure the security of network communication as much as possible.
2.3. Key technologies of network security
The key technologies of information retrieval network security in network communication can be divided into security technology based on network equipment, technology based on server security and technology based on client security based on the difference of service objects[5]. The security technology based on network equipment in network communication includes address and port conversion, control of virtual terminal access, port, set access list, MAC address binding, VLAN security control HTTP access, prevent worm virus and so on. The server-based security technology in network communication includes network connection strategy, account security policy, local security policy and so on.

In addition, for wireless network communication, common network communication information retrieval security technologies include encryption transmission, authentication, modifying SSID and forbidding SSID broadcast, disable DHCP service, disable or modify SNMP settings, use access list and place wireless AP and antenna.

2.4. Management of information retrieval security in network communication
The security management of information retrieval in network communication is mainly based on the principles of responsibility, limitation and separation[6]. In the key nodes of network communication, anti-virus software and intrusion detection detector are set for comprehensive management. At the same time, the security analysis software is fully used to scan, analyse and dispose the network communication equipment, server and workstation. In addition, through the identity authentication of the threat operation of information retrieval in network communication, multi-dimensional audit is carried out for users, timely warning and disposal of threat events are carried out, and the disposal management log is automatically generated, and the data is effectively backed up.

3. Application and development trend of information retrieval technology in network communication

3.1. Application of retrieval technology in network communication
With the further iterative development of network communication, information retrieval technology also needs to keep pace with the times, so as to meet the continuous improvement of information
retrieval needs of users. At present, the single information retrieval technology and tool cannot meet the increasingly complex requirements of network communication. It is necessary to realize a series of operation requests such as the comparison, screening and verification of information retrieval based on the organic integration of multiple technologies and tools. Integrated network communication information retrieval can carry out parallel retrieval based on multiple search engines, which can improve the retrieval efficiency and accuracy at the same time, so it has been widely used.

3.2. The development trend of retrieval technology in network communication

With the increasingly severe form of network communication security, people put forward higher requirements for the security of retrieval technology based on network retrieval tools. The organic integration of network security tools and information retrieval technology in network communication has become one of the development trends and research hotspots of information retrieval technology. In addition, the further development of the retrieval technology in network communication for the sorting of retrieval results and the personalized demand of the retrieval interface has gradually deepened and become the new trend of the application and development of the retrieval technology in the network communication, in which, the former can automatically classify the retrieval results, while the latter can further meet the personalized retrieval needs of users.

4. Conclusion

In summary, with the iterative development of network communication, in order to effectively guarantee the security and reliability of network communication, it is required to strengthen the application of information retrieval technology in computer communication technology on the basis of full recognition of network security protocol function. The retrieval of network communication information is not only a fast and effective way to obtain the required information, but also has an important value and role for the security of network communication. Through the research and analysis of information retrieval technology and network security technology in network communication, this paper points out the classification and characteristics of information retrieval technology and network security technology in network communication, and gives the specific application and future development trend of information retrieval technology and network security technology in network communication.

References

[1] Gu Xingshe. Research on computer communication network security and related technologies [J]. Scientific and technological innovation and application, 2016,5 (21): 77.
[2] Hu Shenglin. Computer communication network security and related technology exploration [J]. Private science and technology, 2012,5 (18): 104.
[3] Hu Yaping. Application and security protection strategy of computer communication technology in the information age [J]. China new technology and new products, 2016,5 (15): 175-176.
[4] Li Zhijun, Liao Minghong. Trust based P2P authenticity query and replica management algorithm [J]. Acta software, 2006. 13 (21): 59-63.
[5] Lu Wenyi. The role of network security protocol in computer communication technology [J]. Information communication, 2015,8 (16): 128.
[6] Luo Huiying. Analysis of network security protocol in computer network communication [J]. Network security technology and application, 2015,11 (21): 92-93.