The Role of Computer Network Security Technologies in Modern Network Security Maintenance

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Abstract: ***Amidst the rapid advancement of the modern socio-economic landscape, computer network technology in China has gained significant developmental opportunities and a robust platform for growth. Drawing from practical experience in production and daily life, it is evident that computer network technology has gradually become an integral component of everyday activities, exerting a substantial influence on the conduct of production and living processes. Concurrently, with the widespread adoption of computer network technology across the country, associated network security concerns have grown increasingly prominent. These security issues not only impede normal production and daily life but also generate adverse effects on broader societal development. In response to this context, this paper primarily analyzes and explores the practical and effective application of computer network security technologies in network security maintenance, with the aim of promoting continued progress and development of computer network technology in China.***

Keywords: Computer Network, Network Security Calculation, Network Security Maintenance, Technology Application.

1. INTRODUCTION

In reality, computer network technology is a double-edged sword. In the daily production and life of modern people, the practical application of computer network technology can improve production efficiency to a certain extent. However, there are also a series of computer network technology application problems that endanger the normal and effective development of production activities. In this situation, the existence and development of computer network security technology have extremely important practical value. It can largely solve a series of development problems that arise in the application process of computer network technology, and play an important role in ensuring computer network security. Therefore, it can greatly promote the progress and development of computer network technology and even the entire industry. Yang et al. [1] proposed dynamic hedging strategies in derivatives markets using LLM-driven sentiment and news analytics. In medical image processing, Tian, Wang, and Cui [2] developed an improved U-Net for brain tumor segmentation incorporating GSConv and ECA attention mechanisms. Yang [3] demonstrated the application of LightGBM in the Chinese stock market, while Zhao et al. [4] optimized deep learning models for dynamic market behavior prediction. For credit risk management, Yang et al. [5] designed a full-cycle intelligent risk control system for pre-loan, mid-loan, and post-loan lending using AI-driven closed-loop management. Shen et al. [6] researched the whale optimization algorithm for financial payment fraud detection. Ren [7] enhanced Seq2Seq models for role-oriented dialogue summary generation through adaptive feature weighting and dynamic statistical conditioning, and Ren [8] proposed a novel feature fusion-based model for smoking detection under complex contextual conditions. Ximeng and Yiming [9] applied offline conservative reinforcement learning to transaction authorization, balancing fraud risk and customer friction. Zhou [10] developed a digital precision distribution strategy for social media content on private domain platforms in the automotive industry using a collaborative filtering model based on user behavior. Wensi [11] investigated AI-assisted marketing content generation for non-standard industrial automation solutions. Wu, Luo, and Liao [12] addressed small-sample object detection of surface cracks in concrete structures of high-rise buildings via multi-level transfer learning. Li [13] focused on AI-based prediction and management of automation equipment lifecycle costs as a pathway to enhancing customer lifetime value. Yi [14] proposed real-time fair-exposure ad allocation for SMBs and underserved creators using contextual bandits-with-knapsacks. Tang et al. [15] presented design and optimization of shallow-angle grating couplers for vertical emission from indium phosphide devices. Finally, Deng and Yang [16] developed multi-layer defense strategies and privacy-preserving enhancements against membership reasoning attacks in a federated learning framework.

2. ANALYSIS OF THE DEVELOPMENT STATUS OF NETWORK SECURITY MAINTENANCE IN REALISTIC SITUATIONS

Based on the actual production and living conditions, it can be seen that there are a series of developmental problems in the entire process of network security maintenance work, which are not conducive to the realization of computer network security maintenance tasks. The specific contents are:

2.1 The objective existence of corresponding development defects in computer network systems

In the field of computer industry, it is of great practical significance to pay attention to the development of computer network systems and computer software and hardware equipment in order to ensure the effective application of computer network technology. Based on the actual production and living situation in China, it can be seen that there are corresponding development defects in the computer network system itself. The objective existence of these defects usually hinders the implementation of network security maintenance work to a large extent. The specific content is as follows: firstly, throughout the process of social development in China, based on the progress and development of the computer industry, China's computer network technology has made great progress. In contrast, the existing computer network operating systems in China have made relatively slow progress, which cannot well meet the application needs of computer network technology, increase the possibility of computer virus invasion, and is not conducive to network security maintenance; Secondly, based on the current situation, it can be seen that there are a series of inherent development defects in China's computer network operating systems, such as the inability to keep up with the pace of computer software and hardware technology updates. The existence of these defects will also greatly hinder the implementation of computer network security maintenance activities.

2.2 Development characteristics of openness in computer networks

In actual production and life, openness is an important component of the development characteristics of computer network technology. Based on this feature of computer network technology, information and data sharing can be achieved globally, and the practical application advantages of the entire computer network technology have been greatly demonstrated. At the same time, based on the open development characteristics of computer networks, in the practical application of computer network technology, hackers and other illegal elements occupy a relatively advantageous position in network intrusion, which not only affects the normal life and lifestyle of the people, but also has a series of adverse effects on the development of the entire society. On the one hand, hackers and other criminals will maliciously invade other people's computer network systems based on their advanced computer network technology, and copy, delete, and modify relevant data and information content, which greatly interferes with the normal life of modern people; On the other hand, the existence and development of a series of computer viruses such as Trojan viruses, under the influence of the open characteristics of computer networks, usually spread over a large area and at high speed, leading to the occurrence of computer network system paralysis in some areas and causing a series of economic damages.

2.3 Weak awareness of network security maintenance and management

In the field of computer industry, whether it is the inherent development defects of computer network systems themselves or the development characteristics of computer network openness, to some extent, they can be classified as objective factors that affect the development of network security maintenance work. At the same time, in the process of carrying out computer network security maintenance and management activities, the subjective factor of weak awareness of network security maintenance and management usually leads to low efficiency of network security maintenance work, and the corresponding network security maintenance tasks cannot be well implemented. Based on the actual production and living situation, it can be seen that the development status of weak awareness of network security maintenance and management is manifested as follows: in the field of computer industry in China, there is a shortage of high-quality network security maintenance and management talents, and there are certain development limitations. Under such talent development status, network security maintenance and management personnel usually lack good awareness of network security maintenance and management, and greatly neglect the guarantee of computer network security in daily maintenance and management activities, only focusing on the maintenance of computer operating system fluency and stability, resulting in ineffective implementation of network security maintenance work and ineffective guarantee of computer network security.

3. EXPLORE THE PRACTICAL APPLICATION OF COMPUTER NETWORK SECURITY TECHNOLOGY IN NETWORK SECURITY MAINTENANCE

In reality, the implementation of network security maintenance work plays an extremely important role in ensuring the security of computer network technology applications, promoting the existence and development of computer network technology, etc. Based on the actual production and life development status, it can be seen that the practical application of computer network security technology in network security maintenance is mainly manifested in the following aspects:

3.1 Practical Application of Intrusion Detection Technology in Network Security Maintenance

Throughout the practical application of computer network technology, network security maintenance is an important part of the technical operation system, which has a significant impact on the security guarantee, progress, and development of computer network technology. In actual production and life, intrusion detection technology is an important component of China's computer network security technology. The practical application of this technology in network security maintenance can effectively compensate for the development defects of computer operating systems and strengthen computer network security. The specific content is: In the practical application of intrusion detection technology, network security maintenance and management personnel use corresponding computer software and hardware systems to comprehensively detect various data information content propagated in computer networks. By autonomously identifying malicious application behaviors of data information content, network security management and maintenance personnel are reminded to take corresponding maintenance measures to ensure computer network security. At the same time, network security maintenance and management personnel can also establish a comprehensive and real-time computer network monitoring system to comprehensively and effectively monitor the data information content in the network, promoting the implementation of network security maintenance work.

3.2 Practical Application of Encryption Technology in Network Security Maintenance

Throughout the process of maintaining network security, the practical and effective application of encryption technology in computer networks can greatly solve the possibility of information and data theft caused by the open nature of computer networks. While effectively ensuring the security of computer user information and data content, it also promotes the scientific and effective application of computer network technology. In reality, the specific application of encryption technology is that in the process of computer network operation, maintenance, and management, users can independently choose the data encryption method for data content and set corresponding protection passwords, thereby greatly ensuring the security of computer network information data content and reducing the possibility of successful hacker network intrusion.

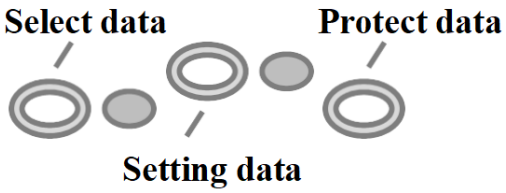

Figure 1: Schematic diagram of the practical application principle of encryption technology

3.3 Practical Application of Firewall Technology in Network Security Maintenance

Throughout the entire process of computer network security maintenance, the practical application of firewall technology in network security maintenance can greatly improve the effectiveness of network security maintenance and management, ensure computer network security, and have an extremely important impact on the long-term development of enterprises. In reality, in order to alleviate the subjective factor of weak awareness of network security maintenance and management among employees, the practical application of diversified firewall technologies has enabled scientific and effective implementation of enterprise network security maintenance work. With the practical application of firewall technologies at the network layer, application layer, or database layer, the overall effectiveness of network security maintenance within the enterprise has been greatly improved; On the other hand, in the process of practical application of firewall technology, employees actively and effectively carry out practical activities, gradually clarifying the importance of establishing awareness of network security maintenance and management, which can greatly strengthen employees' network security maintenance concepts and corresponding security technology levels.

4. CONCLUSION

In summary, through the analysis and discussion in this article, it can be seen that in the process of social development, the practical and effective application of computer network security technology in network security maintenance plays an extremely important role in ensuring the security of the entire computer network, and also contributes to the development of the application of computer network technology.

REFERENCES

[1] Yang, J., Tang, Y., Li, Y., Zhang, L., & Zhang, H. (2025, June). Dynamic Hedging Strategies in Derivatives Markets with LLM-Driven Sentiment and News Analytics. In 2025 International Joint Conference on Neural Networks (IJCNN) (pp. 1-8). IEEE.

[2] Tian, Q., Wang, Z., & Cui, X. (2024). Improved Unet brain tumor image segmentation based on GSConv module and ECA attention mechanism. arXiv preprint arXiv:2409.13626.

[3] Yang, J. (2025). Application of LightGBM in the Chinese Stock Market.

[4] Zhao, S., Lin, Y., Yang, X., Lu, Q., Xue, H., & Jiang, G. (2025). Optimization of Deep Learning Models for Dynamic Market Behavior Prediction. arXiv preprint arXiv:2511.19090.

[5] Yang, X., Xue, H., Hu, Q., & Zhang, Y. (2025, October). Design of a full-cycle intelligent risk control system for pre-loan, mid-loan, and post-loan lending: AI-driven closed-loop management of online credit security. In Proceedings of the 2025 2nd International Conference on Digital Economy and Computer Science (pp. 1022-1027).

[6] Shen, Zepeng, et al. "Research on Application of Whale Optimization Algorithm in Financial Payment Fraud Detection." 2025 4th International Conference on Artificial Intelligence, Internet and Digital Economy (ICAID). IEEE, 2025.

[7] Z. Ren, "Enhancing Seq2Seq Models for Role-Oriented Dialogue Summary Generation Through Adaptive Feature Weighting and Dynamic Statistical Conditioninge," 2024 6th International Conference on Communications, Information System and Computer Engineering (CISCE), Guangzhou, China, 2024, pp. 497-501, doi: 10.1109/CISCE62493.2024.10653360.

[8] Z. Ren, "A Novel Feature Fusion-Based and Complex Contextual Model for Smoking Detection," 2024 6th International Conference on Communications, Information System and Computer Engineering (CISCE), Guangzhou, China, 2024, pp. 1181-1185, doi: 10.1109/CISCE62493.2024.10653351.

[9] Ximeng, Y., & Yiming, Z. (2026). Offline Conservative RL for Transaction Authorization: Smartly Balancing Fraud Risk and Customer Friction. Journal of Economic Theory and Business Management, 3(1), 1-9.

[10] Zhou, Z. (2025, November). Digital precision distribution strategy for social media content on private domain platforms in the automotive industry: a collaborative filtering model based on user behavior. In Proceedings of the 2025 International Conference on Digital Society and Intelligent Computing (pp. 516-521).

[11] Wensi, L. (2026). AI-Assisted Marketing Content Generation for Non-Standard Industrial Automation Solutions. Journal of Economic Theory and Business Management, 3(1), 18-25.

[12] Wu, J., Luo, L., & Liao, N. (2025). Small-Sample Object Detection of Surface Cracks in Concrete Structures of High-Rise Buildings via Multi-Level Transfer Learning. Innovation & Technology Advances, 3(2), 57–72. https://doi.org/10.61187/ita.v3i2.262

[13] Li, W. (2026). AI‐Based Prediction and Management of Automation Equipment Lifecycle Costs: A Pathway to Enhancing Customer Lifetime Value (CLV).

[14] Yi, X. (2025, October). Real-Time Fair-Exposure Ad Allocation for SMBs and Underserved Creators via Contextual Bandits-with-Knapsacks. In Proceedings of the 2025 2nd International Conference on Digital Economy and Computer Science (pp. 1602-1607).

[15] Tang, Y., Kojima, K., Gotoda, M., Nishikawa, S., Hayashi, S., Koike-Akino, T., ... & Klamkin, J. (2020). Design and Optimization of Shallow-Angle Grating Coupler for Vertical Emission from Indium Phosphide Devices.

[16] Deng, X., & Yang, J. (2025, August). Multi-Layer Defense Strategies and Privacy Preserving Enhancements for Membership Reasoning Attacks in a Federated Learning Framework. In 2025 5th International Conference on Computer Science and Blockchain (CCSB) (pp. 278-282). IEEE.