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A UNIFIED BLOCKCHAIN-ENABLED FEDERATED LEARNING ARCHITECTURE FOR ENHANCING SECURITY IN IOT ECOSYSTEMS

SOURAV SADHUKHAN[1]* AND PROMITA DEY[2]

The rapid growth of Internet of Things (IoT) systems has intensified security challenges due to device heterogeneity, centralized data processing, and imbalanced intrusion datasets. Traditional intrusion detection systems struggle to provide scalable and privacy-preserving protection in such environments. This paper proposes a unified Blockchain-Enabled Federated Learning architecture enhanced with Generative Adversarial Networks (GANs) for IoT security. Blockchain ensures decentralized trust and tamper-resistant model update logging, while federated learning enables collaborative training without sharing raw data. GAN-based augmentation improves the detection of minority attacks. Experimental results on the NSL-KDD dataset demonstrate improved detection accuracy, reduced latency, and enhanced robustness compared to conventional IDS approaches.