A Horizontal Federated Learning Approach to IoT Malware Traffic Detection: An Empirical Evaluation with N-BaIoT Dataset

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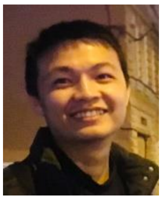
Abstract— **The increasing prevalence of botnet attacks in IoT networks has led to the development of deep learning techniques for their detection. However, conventional centralized deep learning models pose challenges in simultaneously ensuring user data privacy and detecting botnet attacks. To address this issue, this study evaluates the efficacy of Federated Learning (FL) in detecting IoT malware traffic while preserving user privacy. The study employs N-BaIoT, a dataset of real-world IoT network traffic infected by malware, and compares the effectiveness of FL models using Convolutional Neural Network, Long Short-Term Memory, and Gated Recurrent Unit models with a centralized approach. The results indicate that FL can achieve high performance in detecting abnormal traffic in IoT networks, with the CNN model yielding the best results among the three models evaluated. The study recommends the use of FL for IoT malware traffic detection due to its ability to preserve data privacy.**

Keywords— **IoT, abnormal traffics, malware detection, federated learning, AI model**



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