Federated Malware Detection Under Variable Client Participation and Network Heterogeneity

Assignee Research

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Abstract

This report synthesises findings from 13 peer-reviewed papers addressing the following research question: What is the impact of varying client participation rates and network heterogeneity on detection accuracy and model convergence in federated malware detection systems, measured through federated. This work investigates the possibilities enabled by federated learning concerning IoT malware detection and studies security issues inherent to this new learning paradigm. In this context, a framework that uses federated learning to detect malware affecting IoT devices is. 12 claims were extracted from source literature; 0 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 3.2/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: Federated Learning for Malware Detection in IoT Devices. Research question: What is the impact of varying client participation rates and network heterogeneity on detection accuracy and model convergence in federated malware detection systems, measured through federated learning round completion time and final test accuracy?.

2 Methodology

Systematic literature search across multiple databases yielded 13 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 3.2/10.

3 Results

13 papers retrieved. 12 claims extracted; 0 independently verified. Quality review score: 3.2/10.

4 Limitations

This report is a machine-generated literature synthesis and does not constitute original research. Automated retrieval and verification may introduce errors or omissions. Review scores reflect automated assessment, not human peer review. Readers should consult primary sources for authoritative information.

5 Extracted Claims

Claim	Verified	Confidence
In Federated Learning (FL), algorithm training is performed in a decentralized manner by different nodes using local dat	×	0.08
In FL, decentralized nodes share model parameters instead of raw data with the rest of the network.	×	0.05
The aggregation of model parameters to create a global model can be performed through a central server or a peer-to-peer	×	0.06
Previous works on FL for intrusion detection lack the use of realistic datasets in the FL context.	×	0.06
Previous works on FL for intrusion detection lack analysis on adversarial impact.	×	0.08
Previous works on FL for intrusion detection lack discussion of their deployment in B5G scenarios.	×	0.06
The paper presents a use case involving a B5G scenario with Non-IID data and non-trusted stakeholders.	×	0.13
The proposed framework covers both anomaly detection and classification approaches.	×	0.10
Table (p6) indicates a data split where 79% is used for training, 20% for known test, and 1% is unused.	×	0.03
Table (p6) indicates an alternative data split where 39.5% is used for training, 39.5% for threshold selection, 20% for	×	0.02
Table (p12) reports a centralized model performance metric of 95%.	×	0.06
Table (p12) reports a value of 7.8% associated with benign data.	×	0.02

References

- `http://arxiv.org/abs/2104.09994v3`
- `http://arxiv.org/abs/2310.05495v3`
- `http://arxiv.org/abs/2204.12443v2`