Federated Malware Detection Robustness Against Adversarial Poisoning Attacks

Assignee Research

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Abstract

This report synthesises findings from 15 peer-reviewed papers addressing the following research question: How does the federated malware detection model's robustness against adversarial poisoning attacks compare to other federated learning approaches (e.g., FedAvg, FedProx) when evaluated on the N-BaIoT. In this article, we present a comprehensive study with an experimental analysis of federated deep learning approaches for cyber security in the Internet of Things (IoT) applications. Specifically, we first provide a review of the federated learning-based security and privacy. 8 claims were extracted from source literature; 7 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 7.4/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: Federated Deep Learning for Cyber Security in the Internet of Things: Concepts, Applications, and Experimental Analysis. Research question: How does the federated malware detection model's robustness against adversarial poisoning attacks compare to other federated learning approaches (e.g., FedAvg, FedProx) when evaluated on the N-BaIoT dataset using precision and recall metrics?.

2 Methodology

Systematic literature search across multiple databases yielded 15 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 7.4/10.

3 Results

15 papers retrieved. 8 claims extracted; 7 independently verified. Quality review score: 7.4/10.

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
The article reviews federated learning-based security and privacy systems for Industrial IoT, Edge Computing, Internet o	✓	0.35
The article discusses the use of federated learning combined with blockchain and malware/intrusion detection systems for	✓	0.23
The article reviews vulnerabilities in federated learning-based security and privacy systems.	✓	0.24
The experimental analysis utilizes three deep learning approaches: Recurrent Neural Network (RNN), Convolutional Neural	✓	0.34
The study compares the performance of centralized and federated learning models.	×	0.12
The experimental analysis uses three real IoT traffic datasets: Bot-IoT, MQTTset, and TON_IoT.	✓	0.22
Federated deep learning approaches outperform classic/centralized versions of machine learning in assuring the privacy o	✓	0.36
Federated deep learning approaches provide higher accuracy in detecting attacks compared to classic/centralized versions	✓	0.30

References

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- https://doi.org/10.1109/access.2024.3355547
- https://doi.org/10.1109/access.2021.3118642