Memory Replay Integration in GNN-Based Anomaly Detection Throughput and Performance Trade-offs

Assignee Research

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Abstract

This report synthesises findings from 13 peer-reviewed papers addressing the following research question: What is the throughput impact of integrating memory replay mechanisms into GNN-based anomaly detection systems, measured by inference latency and F1 score trade-offs on the UNSW-NB15 dataset. Given the continually rising frequency of cyberattacks, the adoption of artificial intelligence methods, particularly Machine Learning (ML), Deep Learning (DL), and Reinforcement Learning (RL), has become essential in the realm of cybersecurity. These techniques have proven to. 14 claims were extracted from source literature; 13 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 8.0/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: A Comprehensive Survey: Evaluating the Efficiency of Artificial Intelligence and Machine Learning Techniques on Cyber Security Solutions. Research question: What is the throughput impact of integrating memory replay mechanisms into GNN-based anomaly detection systems, measured by inference latency and F1 score trade-offs on the UNSW-NB15 dataset?.

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 8.0/10.

3 Results

13 papers retrieved. 14 claims extracted; 13 independently verified. Quality review score: 8.0/10.

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 frequency of cyberattacks is continually rising.	×	0.14
Machine Learning (ML), Deep Learning (DL), and Reinforcement Learning (RL) are subfields or types of artificial intellig	✓	0.23
ML, DL, and RL techniques have proven effective in detecting and mitigating cyberattacks.	✓	0.27
Cyberattacks can cause significant harm to individuals, organizations, and countries.	✓	0.22
Machine learning algorithms use statistical methods to identify patterns and anomalies in large datasets.	✓	0.27
Machine learning enables security analysts to detect previously unknown threats.	✓	0.19
Deep learning is a subfield of Machine Learning.	✓	0.19
Deep learning has shown potential in improving the accuracy and efficiency of cybersecurity systems, particularly in ima	✓	0.28
Reinforcement Learning (RL) is a subfield of machine learning.	✓	0.21
Reinforcement Learning trains algorithms to learn through trial and error.	✓	0.21
Reinforcement Learning is particularly effective in dynamic environments.	✓	0.18
The article evaluates the usage of ChatGPT-like AI tools in cyber-related problem domains on both positive and negative	✓	0.25
ML, DL, and RL are applied in cybersecurity areas including malware detection, intrusion detection, and vulnerability as	✓	0.27
Challenges and limitations of ML, DL, and RL techniques include data quality and interpretability.	✓	0.17

References

- https://doi.org/10.3390/fi15020083
- https://doi.org/10.1016/j.neucom.2023.126327
- https://doi.org/10.1109/access.2024.3355547