Semi-Supervised Mul-GAD Robustness to Adversarial Attacks on Heterophilic Graphs

Assignee Research

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Abstract

This report synthesises findings from 15 peer-reviewed papers addressing the following research question: How does the semi-supervised approach in Mul-GAD affect its robustness to adversarial attacks compared to fully unsupervised GNN-based anomaly detection methods on heterophilic graphs, measured by. Graph anomaly detection (GAD) under semi-supervised setting poses a significant challenge due to the distinct structural distribution between anomalous and normal nodes. Specifically, anomalous nodes constitute a minority and exhibit high heterophily and low homophily compared. 9 claims were extracted from source literature; 9 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: Revisiting Attack-Caused Structural Distribution Shift in Graph Anomaly Detection. Research question: How does the semi-supervised approach in Mul-GAD affect its robustness to adversarial attacks compared to fully unsupervised GNN-based anomaly detection methods on heterophilic graphs, measured by AUC scores?.

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 8.0/10.

3 Results

15 papers retrieved. 9 claims extracted; 9 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
Graph anomaly detection (GAD) under semi-supervised setting poses a significant challenge due to the distinct structural	✓	0.38
Anomalous nodes constitute a minority and exhibit high heterophily and low homophily compared to normal nodes.	✓	0.34
The distribution of neighbors of the two types of nodes is close, making them difficult to distinguish during aggregatio	✓	0.27
Graph adversarial attacks can amplify the heterophily difference across training and testing data, namely distribution s	✓	0.32
Current methods for GAD tend to overlook SDS, resulting in poor generalization and limited effectiveness.	✓	0.29
The degree of SDS varies between anomalies and normal nodes.	✓	0.25
The key lies in (1) resisting high heterophily for anomalies and (2) benefiting the learning of normals from homophily.	✓	0.28
GDN teases out the anomaly features that make great contributions to GAD to mitigate the effect of heterophilous neighbo	✓	0.33
GDN constrains the remaining features for normal nodes to preserve the connectivity of nodes and reinforce the influence	✓	0.28

References

- http://arxiv.org/abs/1404.4679v2
- http://arxiv.org/abs/2212.05478v1
- https://www.semanticscholar.org/paper/70e4451cd67945515adac5f864b59aa88e7dc95b