

Mul-GAD Sample Efficiency in Low-Label Graph Anomaly Detection vs. Contrastive Methods

Assignee Research

June 1, 2026

Abstract

This report synthesises findings from 10 peer-reviewed papers addressing the following research question: How does the sample efficiency of Mul-GAD in low-label regimes compare to recent contrastive learning approaches for graph anomaly detection. Anomaly detection has been used for decades to identify and extract anomalous components from data. Many techniques have been used to detect anomalies. 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: Machine Learning for Anomaly Detection: A Systematic Review. Research question: How does the sample efficiency of Mul-GAD in low-label regimes compare to recent contrastive learning approaches for graph anomaly detection?.

2 Methodology

Systematic literature search across multiple databases yielded 10 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

10 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
Anomaly detection has been used for decades to identify and extract anomalous components from data.	✓	0.27
Machine Learning (ML) is an increasingly significant technique for anomaly detection.	✓	0.20
The review analyzes ML models for anomaly detection from four perspectives: applications, ML techniques, performance met	✓	0.32
The review identified 290 research articles discussing ML techniques for anomaly detection, written from 2000-2020.	✓	0.32
The review presents 43 different applications of anomaly detection found in the selected research articles.	✓	0.31
The review identifies 29 distinct ML models used in the identification of anomalies.	✓	0.25
The review presents 22 different datasets applied in experiments on anomaly detection, as well as many other general dat	✓	0.25
Unsupervised anomaly detection has been adopted by researchers more than other classification anomaly detection systems.	✓	0.28
Detection of anomalies using ML models is a promising area of research with many implemented models.	✓	0.31

References

- <https://doi.org/10.48550/arxiv.2306.12251>
- <https://doi.org/10.1109/access.2021.3083060>
- <https://doi.org/10.1109/mgrs.2025.3533605>