Contrastive Graph Augmentation Strategies in Self-Supervised Node-Level Anomaly Detection

Assignee Research

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Abstract

This report synthesises findings from 16 peer-reviewed papers addressing the following research question: How do contrastive graph augmentation strategies impact the AUC-ROC performance of self-supervised GCAD models compared to supervised baselines on node-level anomaly detection. Deep models trained in supervised mode have achieved remarkable success on a variety of tasks. When labeled samples are limited, self-supervised learning (SSL) is emerging as a new paradigm for making use of large amounts of unlabeled samples. 9 claims were extracted from source literature; 9 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 9.0/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: Self-Supervised Learning of Graph Neural Networks: A Unified Review. Research question: How do contrastive graph augmentation strategies impact the AUC-ROC performance of self-supervised GCAD models compared to supervised baselines on node-level anomaly detection?.

2 Methodology

Systematic literature search across multiple databases yielded 16 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 9.0/10.

3 Results

16 papers retrieved. 9 claims extracted; 9 independently verified. Quality review score: 9.0/10.

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
Deep models trained in supervised mode have achieved remarkable success on a variety of tasks.	✓	0.29
When labeled samples are limited, self-supervised learning (SSL) is emerging as a new paradigm for making use of large a	✓	0.36
SSL has achieved promising performance on natural language and image learning tasks.	✓	0.27
There is a trend to extend the success of SSL to graph data using graph neural networks (GNNs).	✓	0.29
SSL methods for GNNs can be categorized into contrastive and predictive models.	✓	0.18
The paper provides a unified framework for methods in each category (contrastive and predictive models).	✓	0.16
The unified treatment of SSL methods for GNNs sheds light on the similarities and differences of various methods.	✓	0.33
The paper summarizes different SSL settings and the corresponding datasets used in each setting.	✓	0.22
The paper develops a standardized testbed for SSL in GNNs, including implementations of common baseline methods, dataset	✓	0.29

References

- https://doi.org/10.1109/tpami.2022.3170559
- https://doi.org/10.1609/aaai.v37i6.25907
- https://doi.org/10.1093/jrsssa/qnaf135