

Synthetic Graph Augmentation and Contrastive Learning for Few-Shot Node Classification

Assignee Research

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Abstract

This report synthesises findings from 8 peer-reviewed papers addressing the following research question: Can hybrid approaches combining synthetic graph augmentation with contrastive learning objectives outperform pure variational inference baselines in few-shot node classification tasks on large-scale. Graphs are present in many real-world applications, such as financial fraud detection, commercial recommendation, and social network analysis. But given the high cost of graph annotation or labeling, we face a severe graph label-scarcity problem, i.e., a graph might have a few. 11 claims were extracted from source literature; 2 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 4.2/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: Supervised Graph Contrastive Learning for Few-shot Node Classification. Research question: Can hybrid approaches combining synthetic graph augmentation with contrastive learning objectives outperform pure variational inference baselines in few-shot node classification tasks on large-scale heterogeneous graphs?.

2 Methodology

Systematic literature search across multiple databases yielded 8 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 4.2/10.

3 Results

8 papers retrieved. 11 claims extracted; 2 independently verified. Quality review score: 4.2/10.

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 proposed framework is evaluated by comparing with three categories of methods for few-shot node classification: naiv	✓	0.21
The experiments are conducted on three widely used graph few-shot learning benchmark datasets: CoraFull, Reddit, and Ogb	×	0.14
The statistics of the datasets are given in Table 1.	×	0.04
The baseline methods include naive supervised pretraining, state-of-the-art meta-learning methods for few-shot node clas	✓	0.16
The evaluation protocol involves averaging accuracy values over 10 random seeds and sharing the same splits of base clas	×	0.02
The graph encoder g_{θ} consists of one GCN layer with PReLU activation.	×	0.05
The essence of few-shot node classification is to learn an encoder g_{θ} that can transfer the topological and semantic kno	×	0.08
Meta-learning is adopted to jointly learn g_{θ} and f_{ψ} by episodically optimizing the Cross-Entropy Loss (CEL) on sampled m	×	0.07
Optimizing CEL over sampled piecemeal graph structures will engender node embeddings excessively discriminative against	×	0.04
The proposed method is a decoupled method to learn the graph encoder g_{θ} and the final node classifier f_{ψ} separately.	×	0.05
The proposed method uses supervised graph contrastive learning to first pretrain the graph encoder g_{θ} .	×	0.14

References

- <http://arxiv.org/abs/2206.07869v1>
- <http://arxiv.org/abs/2203.15936v4>
- <http://arxiv.org/abs/2112.10006v6>