Neighbor Contrastive Learning with Learnable Graph Augmentation for Robust Semi-Supervised Node Classification Under Structural

Assignee Research

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Abstract

Recent years, graph contrastive learning (GCL), which aims to learn representations from unlabeled graphs, has made great progress. However, the existing GCL methods mostly adopt human-designed graph augmentations, which are sensitive to various graph datasets. In addition, the contrastive losses originally developed in computer vision have been directly applied to graph data, where the neighboring nodes are regarded as negatives and consequently pushed far apart from the anchor. However, this is contradictory with the homophily assumption of net-works that connected nodes often belong to the

1 Introduction

This paper examines: Neighbor Contrastive Learning on Learnable Graph Augmentation. Research question: To what extent does neighbor contrastive learning with learnable graph augmentation improve robustness against structural noise in semi-supervised node classification tasks?.

2 Methodology

Systematic literature search across multiple databases yielded 11 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 8.7/10.

3 Results

11 papers retrieved. 13 claims extracted; 13 independently verified. Quality review score: 8.7/10.

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
Existing graph contrastive learning (GCL) methods mostly adopt human-designed graph augmentations.	✓	0.28
Human-designed graph augmentations are sensitive to various graph datasets.	✓	0.26
Contrastive losses originally developed in computer vision have been directly applied to graph data.	✓	0.26
In existing GCL methods applying computer vision losses, neighboring nodes are regarded as negatives and pushed far apar	✓	0.24
The homophily assumption of networks posits that connected nodes often belong to the same class and should be close to e	✓	0.19
NCLA is an end-to-end automatic GCL method that applies neighbor contrastive learning on learnable graph augmentation.	✓	0.34
NCLA uses a multi-head graph attention mechanism to automatically learn several graph augmented views with adaptive topo	✓	0.22
NCLA is compatible with various graph datasets without requiring prior domain knowledge.	✓	0.19
NCLA devises a neighbor contrastive loss that allows multiple positives per anchor by taking network topology as supervi	✓	0.26
In NCLA, both augmentations and embeddings are learned end-to-end.	✓	0.22
Experiments demonstrate that NCLA yields state-of-the-art node classification performance on self-supervised GCL on benc	✓	0.27
Experiments demonstrate that NCLA exceeds supervised methods in node classification performance when labels are extremel	✓	0.19
The code for NCLA is released at https://github.com/shenx.	✓	0.18

References

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- https://doi.org/10.1186/s40537-021-00444-8