

Self-Mutual Learning vs. Teacher-Only Baselines in Spatio-Temporal Graph Inference Efficiency

Assignee Research

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Abstract

This report synthesises findings from 12 peer-reviewed papers addressing the following research question: How does the self-mutual learning approach compare to teacher-only baselines in inference efficiency on spatio-temporal graph datasets when evaluated using standard graph neural network benchmarks. Knowledge distillation is a learning paradigm for boosting resource-efficient graph neural networks (GNNs) using more expressive yet cumbersome teacher models. Past work on distillation for GNNs proposed the Local Structure Preserving loss (LSP), which matches local structural. 12 claims were extracted from source literature; 0 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 2.8/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: On Representation Knowledge Distillation for Graph Neural Networks. Research question: How does the self-mutual learning approach compare to teacher-only baselines in inference efficiency on spatio-temporal graph datasets when evaluated using standard graph neural network benchmarks such as DGL or PyTorch Geometric?.

2 Methodology

Systematic literature search across multiple databases yielded 12 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 2.8/10.

3 Results

12 papers retrieved. 12 claims extracted; 0 independently verified. Quality review score: 2.8/10.

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 |
|--|----------|------------|
| PNA is the most expressive message passing GNN but explicitly materializes messages over graph edges, leading to higher | × | 0.04 |
| The implicit G-CRD technique consistently improves over the supervised student’s performance in molecular graph property | × | 0.05 |
| G-CRD outperforms the explicit global structure preserving approach (GSP) in molecular graph property prediction tasks. | × | 0.12 |
| GSP outperforms the purely local approach (LSP) in molecular graph property prediction tasks. | × | 0.06 |
| G-CRD is the only distillation technique that improves over the KD baseline for most teacher-student combinations in mol | × | 0.09 |
| Semantic segmentation of 3D scene graphs is a safety critical real-time task with applications in autonomous driving and | × | 0.04 |
| Recent state-of-the-art architectures for 3D point cloud semantic segmentation involve strong geometric priors and compl | × | 0.03 |
| In Table 4, the supervised teacher (GAT 3L) achieved an accuracy of 73.91 \pm 0.12% on the ARXIV dataset. | × | 0.04 |
| In Table 4, the FitNet distillation technique resulted in a performance regression compared to logit-based KD for the GA | × | 0.05 |
| In Table 4, the AT distillation technique resulted in a performance regression compared to logit-based KD for all listed | × | 0.07 |
| The Global Structure Preserving (GSP) objective calculates loss by regressing student pairwise cosine similarities to ma | × | 0.11 |
| The G-CRD criterion involves projecting student and teacher features through learned projection heads before L2-normaliz | × | 0.05 |

References

- <http://arxiv.org/abs/2502.04140v2>

- <http://arxiv.org/abs/2111.04964v4>
- <http://arxiv.org/abs/1905.06393v1>