

# Empirical Performance of Edge-Level Ego-Network Augmented MP-GNNs on Strongly Regular Graphs

Assignee Research

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## Abstract

We present a novel edge-level ego-network encoding for learning on graphs that can boost Message Passing Graph Neural Networks (MP-GNNs) by providing additional node and edge features or extending message-passing formats. The proposed encoding is sufficient to distinguish Strongly Regular Graphs, a family of challenging 3-WL equivalent graphs. We show theoretically that such encoding is more expressive than node-based sub-graph MP-GNNs. In an empirical evaluation on four benchmarks with 10 graph datasets, our results match or improve previous baselines on expressivity, graph classification, gr

## 1 Introduction

This paper examines: Improving Subgraph-GNNs via Edge-Level Ego-Network Encodings. Research question: What is the empirical performance difference between MP-GNNs augmented with edge-level ego-network encodings and standard MP-GNNs on downstream tasks involving strongly regular graphs, evaluated using metrics such as classification accuracy and convergence speed?.

## 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 8.3/10.

## 3 Results

10 papers retrieved. 4 claims extracted; 4 independently verified. Quality review score: 8.3/10.

## 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 edge-level ego-network encoding is sufficient to distinguish Strongly Regular Graphs, a family of challenging	✓	0.46
The edge-level ego-network encoding is more expressive than node-based sub-graph MP-GNNs.	✓	0.46
The proposed encoding improves previous baselines on expressivity, graph classification, graph regression, and proximity	✓	0.36
The proposed encoding reduces memory usage by 18.1x in certain real-world settings.	✓	0.29

## References

- <https://doi.org/10.3390/make5040063>
- <https://doi.org/10.1145/3580305.3599390>
- <https://doi.org/10.48550/arxiv.2312.05905>