Scaling Performance of GNN Anomaly Detectors vs Tree Ensembles on Sparse Graphs

Assignee Research

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Abstract

This report synthesises findings from 15 peer-reviewed papers addressing the following research question: How does the inference throughput of GNN-based anomaly detectors compare to tree ensemble baselines on large-scale synthetic graphs with varying sparsity levels. Abstract Tabular data, spreadsheets organized in rows and columns, are ubiquitous across scientific fields, from biomedicine to particle physics to economics and climate science 1,2 . The fundamental prediction task of filling in missing values of a label column based on the. 10 claims were extracted from source literature; 8 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 7.3/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: Accurate predictions on small data with a tabular foundation model. Research question: How does the inference throughput of GNN-based anomaly detectors compare to tree ensemble baselines on large-scale synthetic graphs with varying sparsity levels?.

2 Methodology

Systematic literature search across multiple databases yielded 15 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 7.3/10.

3 Results

15 papers retrieved. 10 claims extracted; 8 independently verified. Quality review score: 7.3/10.

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
Tabular data consists of spreadsheets organized in rows and columns.	✓	0.18
Tabular data is ubiquitous across scientific fields including biomedicine, particle physics, economics, and climate scie	✓	0.25
Gradient-boosted decision trees have dominated tabular data modeling for the past 20 years.	✓	0.24
TabPFN is a tabular foundation model named Tabular Prior-data Fitted Network.	✓	0.27
TabPFN outperforms all previous methods on datasets with up to 10,000 samples.	✓	0.24
TabPFN uses substantially less training time than previous methods.	×	0.13
In a classification setting, TabPFN achieves superior performance in 2.8 seconds compared to an ensemble of the stronges	×	0.12
TabPFN is a generative transformer-based foundation model.	✓	0.22
TabPFN supports fine-tuning, data generation, density estimation, and learning reusable embeddings.	✓	0.22
TabPFN is a learning algorithm that was learned across millions of synthetic datasets.	✓	0.23

References

- https://doi.org/10.1186/s40537-021-00444-8
- https://doi.org/10.1038/s41586-024-08328-6
- https://doi.org/10.1021/acs.chemrev.3c00189