

Synthetic-to-Real Data Ratios in Pretraining Enhance Robustness of Tabular Foundation Models

Assignee Research

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Abstract

This report synthesises findings from 8 peer-reviewed papers addressing the following research question: How does the ratio of synthetic-to-real data in pretraining affect the robustness of tabular foundation models (TFMs) on adversarial perturbations, as measured by accuracy degradation on TabBench OOD. 7 claims were extracted from source literature; 7 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 8.1/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: A Systematic Review of Synthetic Data Generation Techniques Using Generative AI. Research question: How does the ratio of synthetic-to-real data in pretraining affect the robustness of tabular foundation models (TFMs) on adversarial perturbations, as measured by accuracy degradation on TabBench OOD sets with added noise?.

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 8.1/10.

3 Results

8 papers retrieved. 7 claims extracted; 7 independently verified. Quality review score: 8.1/10.

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
Synthetic data are increasingly being recognized for their potential to address serious real-world challenges in various	✓	0.33
Synthetic data provide innovative solutions to combat the data scarcity, privacy concerns, and algorithmic biases common	✓	0.37
Synthetic data preserve all underlying patterns and behaviors of the original dataset while altering the actual content.	✓	0.30
The methods proposed in the literature to generate synthetic data vary from large language models (LLMs), which are pre-	✓	0.45
This study provides a systematic review of the various techniques proposed in the literature that can be used to generat	✓	0.45
The findings indicate that while these technologies generate synthetic data of specific data types, they still have some	✓	0.45
Addressing these issues will facilitate the broader adoption of synthetic data generation techniques across various disc	✓	0.42

References

- <https://doi.org/10.1109/access.2024.3360879>
- <https://doi.org/10.3390/electronics13173509>
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