

Novel Evaluation Metrics for Generative Models in Tabular Domains with Varying SCM Complexities

Assignee Research

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Abstract

This report synthesises findings from 12 peer-reviewed papers addressing the following research question: How do novel evaluation metrics for generative models (e.g., structural similarity scores) compare to traditional metrics (e.g., Inception Score) in evaluating the robustness of fine-tuned TFMs. 10 claims were extracted from source literature; 3 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 5.2/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: Evaluating Generative Models for Tabular Data: Novel Metrics and Benchmarking. Research question: How do novel evaluation metrics for generative models (e.g., structural similarity scores) compare to traditional metrics (e.g., Inception Score) in evaluating the robustness of fine-tuned TFMs across tabular domains with different SCM complexities?.

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 5.2/10.

3 Results

12 papers retrieved. 10 claims extracted; 3 independently verified. Quality review score: 5.2/10.

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
FAED effectively captures generative modeling issues overlooked by existing metrics.	✓	0.28
FPCAD exhibits promising performance but requires further refinements to enhance its reliability.	✓	0.18
FAED successfully detects all synthesized problems, whereas FPCAD shows promising but improvable performance.	×	0.05
Existing metrics fail to identify key issues in generative modeling for tabular data.	×	0.14
FAED, FPCAD, and RFIS are novel evaluation metrics tailored for assessing generative models in tabular data.	✓	0.33
Existing evaluation principles from the image domain can be adapted for tabular data.	×	0.12
SDV Fidelity, Utility, TSTR, and TRTS exhibit limitations in detecting key generative modeling challenges.	×	0.13
FAED, FPCAD, and RFIS effectively capture issues such as Quality Decrease, Mode Drop, and Mode Collapse compared to exis	×	0.11
TSTR is useful for detecting cases where synthetic data only partially represents real data.	×	0.05
TRTS assesses whether synthetic samples introduce patterns absent in real data.	×	0.06

References

- <http://arxiv.org/abs/2601.04110v2>
- <http://arxiv.org/abs/1909.03564v2>
- <http://arxiv.org/abs/2504.20900v1>