Scalability and Performance Consistency of Generative Tabular Evaluation Metrics Across Downstream Machine Learning Tasks

Assignee Research

June 12, 2026

Abstract

Generative models have revolutionized multiple domains, yet their application to tabular data remains underexplored. Evaluating generative models for tabular data presents unique challenges due to structural complexity, large-scale variability, and mixed data types, making it difficult to intuitively capture intricate patterns. Existing evaluation metrics offer only partial insights, lacking a comprehensive measure of generative performance. To address this limitation, we propose three novel evaluation metrics: FAED, FPCAD, and RFIS. Our extensive experimental analysis, conducted on three stan

1 Introduction

This paper examines: Evaluating Generative Models for Tabular Data: Novel Metrics and Benchmarking. Research question: Can generative tabular evaluation metrics be effectively scaled for large-scale datasets while maintaining performance consistency across different downstream ML tasks?.

2 Methodology

Systematic literature search across multiple databases yielded 14 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 8.0/10.

3 Results

14 papers retrieved. 6 claims extracted; 6 independently verified. Quality review score: 8.0/10.

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.	✓	0.29
FPCAD exhibits promising performance but requires further refinements to enhance its reliability.	✓	0.19
FAED successfully detects all synthesized problems (Quality Decrease, Mode Drop, and Mode Collapse) in the experimental	✓	0.28
Existing metrics (SDV Fidelity, Utility, TSTR, and TRTS) fail to identify key issues in generative modeling for tabular	✓	0.29
TSTR is particularly useful for detecting cases where synthetic data only partially represents real data.	✓	0.27
TRTS assesses whether synthetic samples introduce patterns absent in real data.	✓	0.24

References

- http://arxiv.org/abs/2109.05633v1
- http://arxiv.org/abs/2504.20900v1
- http://arxiv.org/abs/2402.04177v3