

Correlation of Tabular Generative Metrics with LLM Reasoning Performance in Instruction Tuning

Assignee Research

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Abstract

Tabular instruction tuning has emerged as a promising research direction for improving LLMs understanding of tabular data. However, the majority of existing works only consider question-answering and reasoning tasks over tabular data, leaving tabular data generation largely unnoticed. In this work, for the first time, we explore the efficacy of instruction tuning in improving LLMs tabular data generation capabilities. More specifically, given the high data and computation requirements of tabular instruction tuning, we aim to address the possibility of instruction tuning for tabular data genera

1 Introduction

This paper examines: Instruction Tuning of Large Language Models for Tabular Data Generation-in One Day. Research question: How do novel tabular generative metrics correlate with downstream LLM reasoning performance when synthetic tabular data is used for instruction tuning?.

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 7.5/10.

3 Results

14 papers retrieved. 14 claims extracted; 11 independently verified. Quality review score: 7.5/10.

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
Large language models (LLMs) are widely regarded as emergent repositories of world knowledge.	✓	0.16
LLM performance on table-based tasks remains suboptimal because their pretraining objectives are optimized for the text	✓	0.18
Tabular data exhibits a bi-dimensional and relational structure, whereas LLMs are trained using a uni-dimensional, autor	✓	0.27
Generating natural language instructions based on tabular data and using them for instruction-tuning leads to improvemen	✓	0.20
Instruction tuning on tabular data improves performance on tasks such as table-based reasoning and question answering.	✓	0.17
Prior research on instruction tuning over tabular data primarily focuses on question answering (QA) and reasoning tasks.	✓	0.19
The task of generating tabular data remains largely unaddressed in prior instruction tuning research.	×	0.14
A previous approach required 48 A100 GPUs to instruction-tune a base LLM for table-based question answering and reasonin	✓	0.17
The authors created a high-quality instruction dataset for conditional tabular data generation containing 10,000 instruc	✓	0.17
The instruction dataset includes metadata with general and column-wise descriptions of the table and a snapshot of the i	×	0.15
The authors fine-tuned an open-source LLM on the instruction dataset using a single A100 GPU for less than 6 hours.	✓	0.19
Instruction tuning on the limited dataset significantly increased the base LLM’s capability in tabular data generation.	✓	0.23
The instruction-tuned model achieved competitive results compared to GPT-4o for tabular data generation.	×	0.14
This work is the first in the literature to explore the efficacy of instruction tuning for improving LLM performance on	✓	0.23

References

- <http://arxiv.org/abs/2511.23220v1>
- <http://arxiv.org/abs/2601.04110v2>
- <http://arxiv.org/abs/2504.20900v1>