Instruction Fine-Tuning Effects on Language Model Mathematical Problem-Solving Accuracy

Assignee Research

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Abstract

This report synthesises findings from 12 peer-reviewed papers addressing the following research question: What is the effect of instruction fine-tuning on language model mathematical problem-solving accuracy v9. 15 claims were extracted from source literature; 1 was independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 4.1/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: Large Language Models Reasoning Abilities Under Non-Ideal Conditions After RL-Fine-Tuning. Research question: What is the effect of instruction fine-tuning on language model mathematical problem-solving accuracy v9.

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 4.1/10.

3 Results

12 papers retrieved. 15 claims extracted; 1 independently verified. Quality review score: 4.1/10.

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
The study investigates whether RL-fine-tuned LMs can reason over multiple possibilities and perform summary inference wh	×	0.06
The study investigates whether RL-fine-tuned LMs can ignore fine-grained noise and focus on relevant information to reac	×	0.07
The study investigates whether RL-fine-tuned LMs can disregard irrelevant contextual information to reach valid conclusi	×	0.04
Qwen 2.5-VL-7B-Instruct was used as a Large Vision-Language Model baseline.	×	0.09
Llama 3.1-8B-Instruct, Qwen 3-14B, and Mistral-Small-24B-Instruct-2501 were used as Large Language Model baselines.	×	0.05
CommonsenseQA and Ceval-exam datasets were used to evaluate Research Question 1 for LLMs.	×	0.04
The CommonsenseQA dataset contains 2000 training samples, 500 validation samples, and 1000 test samples.	×	0.02
The Ceval-exam dataset contains 700 training samples, 246 validation samples, and 400 test samples.	×	0.02
Math12k, MathReasoning, Mathverse, and MathVision datasets were used to evaluate Research Questions 2 and 3.	×	0.03
For Research Question 2, TestA represents the original test set and FineTest represents the corresponding noisy test set	×	0.02
For Research Question 3, TestB represents the original test set and FilterTest represents the corresponding test set wit	×	0.02
The study evaluated four RL-fine-tuned LMs and their variants across eight datasets.	×	0.05
RL-fine-tuned LMs exhibit significant performance degradation under non-ideal scenarios compared to ideal conditions.	✓	0.21
Remediation strategies were designed by manipulating format reward and example guidance.	×	0.03
The authors publicly released evaluation datasets designed to assess LM performance under noisy conditions, including fi	×	0.05

References

- http://arxiv.org/abs/2312.10793v3
- http://arxiv.org/abs/2509.25160v1
- http://arxiv.org/abs/2508.04848v1