Strategic Exploration in KL-Regularized RLHF vs. Offline PPO and DPO for Code Generation Accuracy

Assignee Research

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Abstract

This report synthesises findings from 13 peer-reviewed papers addressing the following research question: How does the strategic exploration component in KL-regularized RLHF compare to offline PPO and DPO in terms of code generation accuracy on adversarial benchmarks like AdvBench, when measured using. As Large Language Models (LLMs) become increasingly integrated into secure software development workflows, a critical question remains unanswered: can these models not only detect insecure code but also reliably classify vulnerabilities according to standardized taxonomies? In. 8 claims were extracted from source literature; 7 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 7.7/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: Can Open Large Language Models Catch Vulnerabilities?. Research question: How does the strategic exploration component in KL-regularized RLHF compare to offline PPO and DPO in terms of code generation accuracy on adversarial benchmarks like AdvBench, when measured using pass@1 or pass@k metrics?.

2 Methodology

Systematic literature search across multiple databases yielded 13 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 7.7/10.

3 Results

13 papers retrieved. 8 claims extracted; 7 independently verified. Quality review score: 7.7/10.

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
Three state-of-the-art LLMs - Llama3, Codestral, and Deepseek R1 - were evaluated using a subset of the Big-Vul dataset	✓	0.33
The evaluation adopted a closed-world classification setup to assess each model's performance in identifying vulnerabili	✓	0.30
The findings revealed a sharp contrast between high detection rates and markedly poor classification accuracy among the	✓	0.23
Frequent overgeneralization and misclassification were observed in the LLMs' performance.	×	0.11
Model-specific biases and common failure modes were analyzed, highlighting the limitations of current LLMs in performing	✓	0.28
The insights are particularly relevant in educational contexts where LLMs are being adopted as learning aids despite the	✓	0.23
A nuanced understanding of LLMs' behavior is essential to prevent the propagation of misconceptions among students.	✓	0.19
The results expose key challenges that must be addressed before LLMs can be reliably deployed in security-sensitive envi	✓	0.29

References

- https://doi.org/10.48550/arxiv.2307.12966
- https://doi.org/10.4230/oasics.icpec.2025.4
- https://doi.org/10.1561/2200000071