Structural Complexity and False Positives in DeepSeek R1 Vulnerability Detection

Assignee Research

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Abstract

This report synthesises findings from 7 peer-reviewed papers addressing the following research question: What is the correlation between code structural complexity and false positive rates in Deepseek R1's vulnerability detection performance on the Big-Vul benchmark. 11 claims were extracted from source literature; 4 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 6.5/10. 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: What is the correlation between code structural complexity and false positive rates in Deepseek R1's vulnerability detection performance on the Big-Vul benchmark?.

2 Methodology

Systematic literature search across multiple databases yielded 7 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 6.5/10.

3 Results

7 papers retrieved. 11 claims extracted; 4 independently verified. Quality review score: 6.5/10.

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
The study evaluates three LLMs: Llama3, Codestral, and Deepseek R1.	×	0.14
The evaluation uses a carefully filtered subset of the Big-Vul dataset.	✓	0.17
The dataset subset is annotated with eight representative Common Weakness Enumeration (CWE) categories.	✓	0.17
The study adopts a closed-world classification setup.	×	0.13
The study assesses each model's performance in identifying the presence of vulnerabilities.	×	0.15
The study assesses each model's performance in mapping vulnerabilities to the correct CWE label.	×	0.13
The evaluated models demonstrated high detection rates for vulnerabilities.	×	0.10
The evaluated models demonstrated markedly poor classification accuracy for CWE labels.	×	0.12
The models exhibited frequent overgeneralization and misclassification of vulnerabilities.	×	0.12
The study analyzes model-specific biases and common failure modes.	✓	0.17
LLMs are being adopted as learning aids in educational contexts.	✓	0.18

References

- https://doi.org/10.1186/s42400-025-00518-7
- https://doi.org/10.48550/arxiv.2401.16310
- https://doi.org/10.4230/oasics.icpec.2025.4