Scaling Codestral from 7B to 33B Parameters Reduces False Positives in Vulnerability Detection

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Abstract

This report synthesises findings from 11 peer-reviewed papers addressing the following research question: How does scaling Codestral from 7B to 33B parameters affect false positive rates in vulnerability detection across the Big-Vul dataset. Software vulnerabilities can cause numerous problems, including crashes, data loss, and security breaches. These issues greatly compromise quality and can negatively impact the market adoption of software applications and systems. 14 claims were extracted from source literature; 10 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 7.1/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: SecureFalcon: Are We There Yet in Automated Software Vulnerability Detection with LLMs?. Research question: How does scaling Codestral from 7B to 33B parameters affect false positive rates in vulnerability detection across the Big-Vul dataset?.

2 Methodology

Systematic literature search across multiple databases yielded 11 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 7.1/10.

3 Results

11 papers retrieved. 14 claims extracted; 10 independently verified. Quality review score: 7.1/10.

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
Traditional bug-fixing methods, such as static analysis, often produce false positives.	✓	0.23
Bounded model checking is a form of Formal Verification (FV).	✓	0.21
Bounded model checking demands substantial resources and significantly hinders developer productivity compared to static	✓	0.25
SecureFalcon is a model architecture with 121 million parameters.	✓	0.18
SecureFalcon is derived from the Falcon-40B model.	✓	0.15
SecureFalcon is explicitly tailored for classifying software vulnerabilities.	✓	0.20
SecureFalcon was trained using the FormAI dataset and the FalconVulnDB.	×	0.13
FalconVulnDB is a combination of the SySeVR framework, Draper VDISC, Bigvul, Diversevul, SARD Juliet, and ReVeal dataset	✓	0.26
The datasets used contain the top 25 most dangerous software weaknesses.	✓	0.18
The datasets used include weaknesses such as CWE-119, CWE-120, CWE-476, CWE-122, CWE-190, CWE-121, CWE-78, CWE-787, CWE-	✓	0.35
SecureFalcon achieves 94% accuracy in binary classification.	✓	0.18
SecureFalcon achieves up to 92% accuracy in multiclassification.	×	0.10
SecureFalcon supports instant CPU inference times.	×	0.14
SecureFalcon outperforms existing models.	×	0.11

References

- https://doi.org/10.48550/arxiv.2406.00515
- https://doi.org/10.48550/arxiv.2307.06616
- https://doi.org/10.1016/j.ijinfomgt.2023.102642