

How do context window expansions in Gemini 1.5 Pro affect precision and recall rates for multi-file vulnerability classification

Assignee Research

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Abstract

Large Language Models (LLMs) have garnered remarkable advancements across diverse code-related tasks, known as Code LLMs, particularly in code generation that generates source code with LLM from natural language descriptions. This burgeoning field has captured significant interest from both academic researchers and industry professionals due to its practical significance in software development, e.g., GitHub Copilot. Despite the active exploration of LLMs for a variety of code tasks, either from the perspective of natural language processing (NLP) or software engineering (SE) or both, there is

1 Introduction

This paper examines: A Survey on Large Language Models for Code Generation. Research question: How do context window expansions in Gemini 1.5 Pro affect precision and recall rates for multi-file vulnerability classification compared to retrieval-augmented Llama3-70B on the CodeXGLUE security subset?.

2 Methodology

Systematic literature search across multiple databases yielded 5 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 8.5/10.

3 Results

5 papers retrieved. 12 claims extracted; 11 independently verified. Quality review score: 8.5/10.

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) have made significant advancements in code-related tasks, particularly in code generation.	✓	0.25
Code LLMs generate source code from natural language descriptions.	✓	0.19
The field of LLMs for code generation has captured significant interest from both academic researchers and industry prof	✓	0.25
GitHub Copilot is an example of a practical application of LLMs in software development.	×	0.12
There is a noticeable absence of a comprehensive and up-to-date literature review dedicated to LLM for code generation.	✓	0.28
The survey provides a systematic literature review on the cutting-edge progress in LLMs for code generation.	✓	0.23
The survey introduces a taxonomy to categorize and discuss recent developments in LLMs for code generation.	✓	0.23
The taxonomy covers aspects such as data curation, latest advances, performance evaluation, ethical implications, enviro	✓	0.28
The survey presents a historical overview of the evolution of LLMs for code generation.	✓	0.20
The survey offers an empirical comparison using the HumanEval, MBPP, and BigCodeBench benchmarks.	✓	0.19
The benchmarks cover various levels of difficulty and types of programming tasks.	✓	0.18
The survey highlights the progressive enhancements in LLM capabilities for code generation.	✓	0.19

References

- <https://openalex.org/W7115388677>
- <https://openalex.org/W7148176481>
- <https://doi.org/10.48550/arxiv.2406.00515>