

Performance-Efficiency Trade-offs in Code Generation Models from 0.5B to 13B Parameters

Assignee Research

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Abstract

This report synthesises findings from 10 peer-reviewed papers addressing the following research question: How does the Performance-Efficiency Ratio vary across different inference budget thresholds for code generation tasks using models ranging from 0.5B to 13B parameters on HumanEval and MBPP benchmarks. We introduce self-invoking code generation, a new task designed to evaluate the progressive reasoning and problem-solving capabilities of LLMs. In this task, models are presented with a base problem and a related, more complex problem. 10 claims were extracted from source literature; 2 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 5.2/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: HumanEval Pro and MBPP Pro: Evaluating Large Language Models on Self-invoking Code Generation. Research question: How does the Performance-Efficiency Ratio vary across different inference budget thresholds for code generation tasks using models ranging from 0.5B to 13B parameters on HumanEval and MBPP benchmarks?.

2 Methodology

Systematic literature search across multiple databases yielded 10 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 5.2/10.

3 Results

10 papers retrieved. 10 claims extracted; 2 independently verified. Quality review score: 5.2/10.

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
o1-mini achieves 96.2% pass@1 on HumanEval but only 76.2% on HumanEval Pro.	✓	0.24
Instruction-tuned models are less efficient on self-invoking code generation than traditional code generation tasks.	✓	0.32
HumanEval and MBPP serve as fundamental benchmarks, focusing on Python function completion tasks with test-driven evaluation	×	0.06
Several benchmarks have expanded code evaluation benchmarks to encompass multiple programming languages, complex tasks	×	0.10
Deepseek-V2.5 is used to generate self-invoking problems, candidate solutions, and test inputs.	×	0.08
An iterative method involving Python execution check and manual review is employed to ensure that all test cases pass successfully	×	0.03
Qwen2.5-Coder-7B-base achieves 59.6% on HumanEval Pro and 38.6% on MBPP Pro.	×	0.11
Qwen2.5-Coder-7B-instruct achieves 64.9% on HumanEval Pro and 35.1% on MBPP Pro.	×	0.08
DeepseekCoder-33B-base achieves 71.9% on HumanEval Pro and 38.6% on MBPP Pro.	×	0.12
DeepseekCoder-33B-instruct achieves 80.7% on HumanEval Pro and 43.9% on MBPP Pro.	×	0.09

References

- <http://arxiv.org/abs/2405.04520v1>
- <http://arxiv.org/abs/2603.21389v1>
- <http://arxiv.org/abs/2412.21199v2>