

Sparse MoE and Dense Transformer Performance Gaps in Self-Invoking Code Generation

Assignee Research

May 31, 2026

Abstract

This report synthesises findings from 7 peer-reviewed papers addressing the following research question: How does the performance gap between sparse MoE models and dense transformers on self-invoking code generation tasks vary when evaluated on MBPP Pro compared to HumanEval Pro. 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; 3 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 5.5/10. 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 gap between sparse MoE models and dense transformers on self-invoking code generation tasks vary when evaluated on MBPP Pro compared to HumanEval Pro?.

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 5.5/10.

3 Results

7 papers retrieved. 10 claims extracted; 3 independently verified. Quality review score: 5.5/10.

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
o1-mini achieves 96.2% pass@1 on the HumanEval benchmark.	✓	0.17
o1-mini achieves 76.2% pass@1 on the HumanEval Pro benchmark.	✓	0.18
Instruction-tuned models are less efficient on self-invoking code generation tasks compared to traditional code generation.	✓	0.31
Deepseek-V2.5 was used to generate self-invoking problems, candidate solutions, and test inputs for the benchmark construction.	×	0.04
HumanEval and MBPP are fundamental benchmarks focusing on Python function completion tasks with test-driven evaluation.	×	0.10
OpenCoder-8B-base achieved a score of 56.1 on the Base Problem and 10.5 on the Self-invoking Problem.	×	0.10
OpenCoder-8B-instruct achieved a score of 75.4 on the Base Problem and 22.8 on the Self-invoking Problem.	×	0.10
DeepseekCoder-33B-instruct achieved a score of 80.7 on the Base Problem and 43.9 on the Self-invoking Problem.	×	0.09
Qwen2.5Coder-7B-instruct achieved a score of 64.9 on the Base Problem and 35.1 on the Self-invoking Problem.	×	0.09
The benchmark construction process involves executing generated solutions with test inputs in a controlled Python environment.	×	0.01

References

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

- <http://arxiv.org/abs/2603.11114v1>
- <http://arxiv.org/abs/2402.14800v2>