

DeepSeek R1 Integration in Scalene Enhances Optimization Robustness Across Python Domains

Assignee Research

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Abstract

This report synthesises findings from 14 peer-reviewed papers addressing the following research question: How does the integration of DeepSeek R1 in Scalene affect the robustness of generated optimization suggestions across different Python code domains (e.g., numerical computing, web frameworks), as Python’s flexibility and ease of use come at the cost of performance inefficiencies, requiring developers to rely on profilers to optimize execution. SCALENE, a high-performance CPU, GPU, and memory profiler, provides fine-grained insights into Python applications while running. 9 claims were extracted from source literature; 1 was independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 4.5/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: Open-Source AI-Powered Optimization in Scalene: Advancing Python Performance Profiling with DeepSeek-R1 and LLaMA 3.2. Research question: How does the integration of DeepSeek R1 in Scalene affect the robustness of generated optimization suggestions across different Python code domains (e.g., numerical computing, web frameworks), as measured by HumanEval+ and OpenAI’s code robustness benchmarks?.

2 Methodology

Systematic literature search across multiple databases yielded 14 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 4.5/10.

3 Results

14 papers retrieved. 9 claims extracted; 1 independently verified. Quality review score: 4.5/10.

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
Experiments were conducted on 15 different Python code snippets covering diverse functionalities such as dictionary look	×	0.04
DeepSeek R1 consistently generates more precise and efficient optimizations compared to Llama 3.2.	×	0.08
DeepSeek R1 effectively utilizes GPU acceleration via the CuPy library when applicable, significantly improving performa	×	0.07
Llama 3.2 often produces unnecessary verbose code and sometimes misinterprets the function's intent, introducing redunda	×	0.02
DeepSeek R1 outperforms Llama 3.2 by providing simpler, computationally efficient, and hardware-aware solutions.	×	0.06
DeepSeek R1 excels in identifying bottlenecks, eliminating redundant computations, and utilizing GPU acceleration.	×	0.06
The open-source integration ensures SCALENE remains accessible, transparent, and cost-effective, offering significant pe	✓	0.17
Future work will focus on expanding supported models and refining optimization suggestions to enhance SCALENE's versatil	×	0.08
All the code snippets can be found at http://tiny.cc/scalene-code-sample .	×	0.05

References

- <http://arxiv.org/abs/2503.17371v2>
- <http://arxiv.org/abs/2502.10299v1>
- <http://arxiv.org/abs/2006.03879v2>