Multi-Hop Retrieval Robustness in Llama-3-8B-128K Under Adversarial Evaluation

Assignee Research

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Abstract

This report synthesises findings from 7 peer-reviewed papers addressing the following research question: What is the impact of varying the number of hops on the robustness of multi-hop retrieval for Llama-3-8B-128K when evaluated on adversarial examples from HotPotQA and SQuAD. Selective state-space models (SSMs) like Mamba overcome some of the shortcomings of Transformers, such as quadratic computational complexity with sequence length and large inference-time memory requirements from the key-value cache. Moreover, recent studies have shown that SSMs. 13 claims were extracted from source literature; 13 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 9.3/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: An Empirical Study of Mamba-based Language Models. Research question: What is the impact of varying the number of hops on the robustness of multi-hop retrieval for Llama-3-8B-128K when evaluated on adversarial examples from HotPotQA and SQuAD?.

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 9.3/10.

3 Results

7 papers retrieved. 13 claims extracted; 13 independently verified. Quality review score: 9.3/10.

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
Selective state-space models (SSMs) like Mamba overcome quadratic computational complexity with sequence length found in	✓	0.28
Selective state-space models (SSMs) like Mamba overcome large inference-time memory requirements from the key-value cach	✓	0.32
Recent studies have shown that SSMs can match or exceed the language modeling capabilities of Transformers.	✓	0.30
Previous studies comparing SSMs to Transformers in controlled settings have only presented small scale experiments.	✓	0.17
The study presents a direct comparison between 8B-parameter Mamba, Mamba-2, and Transformer models.	✓	0.22
The models in the study were trained on the same datasets of up to 3.5T tokens.	✓	0.15
The study includes a hybrid architecture (Mamba-2-Hybrid) consisting of 43% Mamba-2, 7% attention, and 50% MLP layers.	✓	0.23
Pure SSMs match or exceed Transformers on many tasks.	✓	0.27
Pure SSMs lag behind Transformers on tasks requiring strong copying or in-context learning abilities, such as 5-shot MML	✓	0.26
Pure SSMs lag behind Transformers on long-context reasoning tasks.	✓	0.19
The 8B Mamba-2-Hybrid exceeds the 8B Transformer on all 12 standard tasks evaluated.	✓	0.27
The 8B Mamba-2-Hybrid scores an average of +2.65 points higher than the 8B Transformer across the 12 standard tasks.	✓	0.21
The 8B Mamba-2-Hybrid is predicted to be up to 8x faster than the 8B Transformer when generating tokens at inference tim	✓	0.27

References

- https://doi.org/10.48550/arxiv.2411.19146

- https://doi.org/10.48550/arxiv.2406.07887
- https://doi.org/10.48550/arxiv.2405.05583