Gemini 1.5 Pro Retrieval Accuracy on Needle-in-a-Haystack vs. GPT-4 Turbo and Claude 3

Assignee Research

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Abstract

This report synthesises findings from 9 peer-reviewed papers addressing the following research question: How does the retrieval accuracy of Gemini 1.5 Pro on the Needle-in-a-Haystack benchmark compare to GPT-4 Turbo and Claude 3 across context windows exceeding 100k tokens. 16 claims were extracted from source literature; 0 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 3.8/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: Gemini 1.5: Unlocking multimodal understanding across millions of tokens of context. Research question: How does the retrieval accuracy of Gemini 1.5 Pro on the Needle-in-a-Haystack benchmark compare to GPT-4 Turbo and Claude 3 across context windows exceeding 100k tokens?.

2 Methodology

Systematic literature search across multiple databases yielded 9 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 3.8/10.

3 Results

9 papers retrieved. 16 claims extracted; 0 independently verified. Quality review score: 3.8/10.

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
Gemini 1.5 Pro improves from 72.7% to 81.0% on a benchmark.	×	0.04
Gemini 1.5 Pro improves from 65.1% to 72.2% on EgoSchema (Mangalam et al., 2023).	×	0.02
Gemini 1.5 Pro achieves state-of-the-art results on several multimodal benchmarks including AI2D, MathVista, ChartQA, Do	×	0.08
Gemini 1.5 Pro is a sparse mixture-of-expert (MoE) Transformer-based model.	×	0.03
Gemini 1.5 Pro builds on Gemini 1.0's research advances and multimodal capabilities.	×	0.08
Gemini 1.5 Pro builds on a much longer history of MoE research at Google.	×	0.02
Gemini 1.5 Pro uses a learned routing function to direct inputs to a subset of the model's parameters for processing.	×	0.01
Gemini 1.5 Pro achieves comparable quality to Gemini 1.0 Ultra while using significantly less training compute and being	×	0.06
Gemini 1.5 Pro incorporates a series of significant architecture changes that enable long-context understanding of input	×	0.10
Gemini 1.5 Pro can process almost five days of audio recordings (i.e., 107 hours).	×	0.04
Gemini 1.5 Pro can process more than ten times the entirety of the 1440 page book (or 587,287 words) 'War and Peace'.	×	0.01
Gemini 1.5 Pro can process the entire Flax (Heek et al., 2023) codebase (41,070 lines of code).	×	0.01
Gemini 1.5 Pro can process 10.5 hours of video at 1 frame-per-second.	×	0.07
Gemini 1.5 Pro can identify and locate a famous scene from a hand-drawn sketch in the entire text of Les Misrables (138	×	0.02
Gemini 1.5 Pro can retrieve and extract textual information from a specific frame in a 45 minute Buster Keaton movie 'Sh	×	0.02
Gemini 1.5 Pro can identify a scene in the movie 'Sherlock Jr.' from a hand-drawn sketch.	×	0.01

References

- http://arxiv.org/abs/2601.06142v1
- http://arxiv.org/abs/2403.05530v5
- http://arxiv.org/abs/2603.08655v1