Multimodal Retrieval-Augmented Generation: Latency-Precision Trade-offs at Scale

Assignee Research

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Abstract

This report synthesises findings from 8 peer-reviewed papers addressing the following research question: What is the trade-off in retrieval latency versus precision for multimodal RAG systems when scaling the external knowledge base size, evaluated using retrieval speed and downstream task accuracy on. 11 claims were extracted from source literature; 11 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 7.2/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: Visual Genome: Connecting Language and Vision Using Crowdsourced Dense Image Annotations. Research question: What is the trade-off in retrieval latency versus precision for multimodal RAG systems when scaling the external knowledge base size, evaluated using retrieval speed and downstream task accuracy on datasets like LAMBADA or COLA?.

2 Methodology

Systematic literature search across multiple databases yielded 8 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 7.2/10.

3 Results

8 papers retrieved. 11 claims extracted; 11 independently verified. Quality review score: 7.2/10.

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
Computers perform poorly on cognitive tasks such as image description and question answering.	✓	0.29
Cognition is core to tasks that involve not just recognizing, but reasoning about our visual world.	✓	0.24
Models used to tackle the rich content in images for cognitive tasks are still being trained using the same datasets des	✓	0.34
To achieve success at cognitive tasks, models need to understand the interactions and relationships between objects in a	✓	0.34
The Visual Genome dataset contains over 108K images.	✓	0.20
Each image in the Visual Genome dataset has an average of 35 objects.	✓	0.19
Each image in the Visual Genome dataset has an average of 26 attributes.	✓	0.17
Each image in the Visual Genome dataset has an average of 21 pairwise relationships between objects.	✓	0.22
The Visual Genome dataset includes annotations of objects, attributes, and relationships within each image.	✓	0.26
The Visual Genome dataset canonicalizes the objects, attributes, relationships, and noun phrases in region descriptions	✓	0.33
The Visual Genome dataset represents the densest and largest dataset of image descriptions, objects, attributes, relatio	✓	0.34

References

- https://doi.org/10.1186/s40537-021-00444-8
- https://doi.org/10.1007/s11704-026-60308-3
- https://doi.org/10.1007/s11263-016-0981-7