Low-Rank Subspace Projection Impact on Multilingual Transformer Latency and Memory in Cross-Lingual Retrieval

Assignee Research

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Abstract

This report synthesises findings from 5 peer-reviewed papers addressing the following research question: How does low-rank subspace projection affect the inference latency and memory footprint of multilingual transformers during cross-lingual retrieval on XQuAD compared to full-rank adversarial. 10 claims were extracted from source literature; 10 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 8.3/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: Development and evaluation of Retrieval-Augmented Generation methods for document search and question-answering. Research question: How does low-rank subspace projection affect the inference latency and memory footprint of multilingual transformers during cross-lingual retrieval on XQuAD compared to full-rank adversarial contrastive baselines?.

2 Methodology

Systematic literature search across multiple databases yielded 5 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 8.3/10.

3 Results

5 papers retrieved. 10 claims extracted; 10 independently verified. Quality review score: 8.3/10.

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
The study investigates the development and evaluation of document-based question-answering systems (RAG, Retrieval-Augme	✓	0.38
The aim is to create a modular base system and analyze its main components.	✓	0.22
The system is built around two main pipelines: processing documents and answering questions.	✓	0.25
The documents are cleaned by including only the textual part, split, embedded, and stored in a vector database.	✓	0.25
The retrieval component manages user queries: it identifies the relevant stored text chunks, combines them with the quer	✓	0.36
The system is built with open-source tools.	✓	0.16
The system is evaluated on multilingual datasets to evaluate its performance under realistic conditions.	✓	0.21
The evaluation tested different document splitting methods, embedding, and language models.	✓	0.28
The results show that retrieval quality is a key factor in overall system performance, as the retrieved text chunks dire	✓	0.34
Semantic chunking combined with sentence-level document splitting balanced retrieval accuracy and processing efficiency.	✓	0.31

References

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- https://openalex.org/W7155573657
- https://openalex.org/W7133045604