

Dynamic Retrieval Parameter Tuning for Cross-Domain Generalization in RAG Systems

Assignee Research

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Abstract

Current AI-driven Question-Answering (QA) systems face significant challenges in delivering accurate, domainspecific responses across diverse fields. While Large Language Models (LLMs) excel at text generation, they often face difficulties in producing precise answers without access to external knowledge sources. Retrieval-Augmented Generation (RAG) addresses this limitation by connecting LLMs to external information sources. However, RAG systems often struggle to maintain the relevance and reliability of the retrieved information. Finetuning rerankers on domain-specific data could improve the

1 Introduction

This paper examines: Domain Adaptive Document Reranking for Retrieval Augmented Generation. Research question: Can dynamic retrieval parameter tuning improve cross-domain generalization in RAG systems compared to static configurations when evaluated on diverse multi-document QA datasets?.

2 Methodology

Systematic literature search across multiple databases yielded 18 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 7.3/10.

3 Results

18 papers retrieved. 8 claims extracted; 8 independently verified. Quality review score: 7.3/10.

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
Large Language Models (LLMs) often face difficulties in producing precise answers without access to external knowledge s	✓	0.27
Retrieval-Augmented Generation (RAG) systems often struggle to maintain the relevance and reliability of the retrieved i	✓	0.29
Fine-tuning rerankers on domain-specific data could improve the selection of relevant text chunks before generation.	✓	0.26
Adapting rerankers for multi-domain RAG settings remains challenging.	✓	0.22
The cost of fine-tuning becomes significant when dealing with large models and extensive datasets.	✓	0.21
The proposed approach leverages the Mixture of Experts (MoE) paradigm when finetuning rerankers within RAG systems.	✓	0.28
The framework employs a routing mechanism that dynamically directs queries to domain-specific experts.	✓	0.22
Experimental results in the agricultural and medical domains demonstrate that the proposed framework outperforms baselin	✓	0.19

References

- <https://www.semanticscholar.org/paper/4361a4157157fb1157712e2fa74de1da68d1479a>
- <https://www.semanticscholar.org/paper/3cbf63e9b8032919ba9277685bcbea090b312d87>
- <https://arxiv.org/abs/2502.18017>