Dense vs. Sparse Retrievers in RAG Systems: Factual Consistency on MS MARCO

Assignee Research

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Abstract

This report synthesises findings from 13 peer-reviewed papers addressing the following research question: How does the integration of dense retrievers like MA-DPR versus sparse lexical methods impact the factual consistency scores of RAG systems on the MS MARCO dataset. This paper proposes a Question-Answering (QA) system for the telecom domain using 3rd Generation Partnership Project (3GPP) technical documents. Alongside, a hybrid dataset, Telco-DPR, which consists of a curated 3GPP corpus in a hybrid format, combining text and tables, is. 11 claims were extracted from source literature; 3 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 5.6/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: Telco-DPR: A Hybrid Dataset for Evaluating Retrieval Models of 3GPP Technical Specifications. Research question: How does the integration of dense retrievers like MA-DPR versus sparse lexical methods impact the factual consistency scores of RAG systems on the MS MARCO dataset?.

2 Methodology

Systematic literature search across multiple databases yielded 13 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 5.6/10.

3 Results

13 papers retrieved. 11 claims extracted; 3 independently verified. Quality review score: 5.6/10.

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 proposed QA system achieved an MRR of 0.68 and an accuracy of 86.2% at rank 10.	×	0.11
The QA system demonstrated a 14% improvement in accuracy on the MCQ dataset when using the GPT-4 model.	×	0.10
The retriever performance at rank 10 for easy questions was 66.6% accuracy and 0.43 MRR.	×	0.05
The retriever performance at rank 10 for intermediate questions was 78.4% accuracy and 0.61 MRR.	×	0.05
The retriever performance at rank 10 for hard questions was 94.7% accuracy and 0.65 MRR.	×	0.05
The overall retriever performance at rank 10 was 78.0% accuracy and 0.56 MRR.	×	0.06
The QA system accuracy using RAG+GPT-4 was 87.0% for easy questions, 86.0% for intermediate questions, 84.0% for hard qu	×	0.05
The Telco-DPR dataset includes a curated 3GPP corpus in a hybrid format, combining text and tables.	✓	0.29
The Telco-DPR dataset includes a set of synthetic question/answer pairs designed to evaluate the retrieval performance o	✓	0.32
The DHR model achieved a Top-10 accuracy of 86.2%.	×	0.12
The proposed QA system, using the developed RAG model and GPT-4, achieves a 14% improvement in answer accuracy compared	✓	0.33

References

- http://arxiv.org/abs/2410.19790v1
- http://arxiv.org/abs/2411.18583v1
- http://arxiv.org/abs/2401.15391v1