

# Effect of Adaptive Refinement Cycles in FAIR-RAG on Hallucination Rates in Long-Form Generation

Assignee Research

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## Abstract

The advent of Large Language Models (LLMs) has revolutionized Natural Language Processing, yet their application in high-stakes, specialized domains like religious question answering is hindered by challenges like hallucination and unfaithfulness to authoritative sources. This issue is particularly critical for the Persian-speaking Muslim community, where accuracy and trustworthiness are paramount. Existing Retrieval-Augmented Generation (RAG) systems, relying on simplistic single-pass pipelines, fall short on complex, multi-hop queries requiring multi-step reasoning and evidence aggregation.

## 1 Introduction

This paper examines: FARSIQA: Faithful and Advanced RAG System for Islamic Question Answering. Research question: What is the effect of adaptive refinement cycles in FAIR-RAG on hallucination rates measured by FactScore in long-form generation tasks?.

## 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 7.4/10.

## 3 Results

13 papers retrieved. 10 claims extracted; 7 independently verified. Quality review score: 7.4/10.

## 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
FARSIQA achieves a 'Answer Correctness' score of 74.3% on the icPCQA benchmark.	✓	0.16
FARSIQA substantially outperforms standard baselines across metrics of relevance, correctness, and robustness.	✓	0.15
FARSIQA is built upon the FAIR-RAG architecture, which employs a dynamic, self-correcting process.	✓	0.21
FAIR-RAG adaptively decomposes complex queries and critically assesses the sufficiency of retrieved evidence.	✓	0.17
FARSIQA operates on a curated knowledge base of over one million documents from authoritative Islamic sources.	×	0.13
FARSIQA achieves a 97.0% score in Negative Rejection, a 40-point improvement over standard baselines.	✓	0.16
The knowledge base of FARSIQA includes approximately 431,000 unique documents from Islamic encyclopedias.	×	0.14
The knowledge base of FARSIQA includes approximately 304,000 question-answer pairs from religious Q&A platforms.	✓	0.16
All sources for the knowledge base were crawled ethically, respecting copyrights and ensuring diversity across Islamic p	✓	0.21
The preprocessing pipeline for encyclopedic articles includes recursive chunking and splitting by paragraphs.	×	0.12

## References

- <http://arxiv.org/abs/2510.22344v1>
- <http://arxiv.org/abs/2404.14464v1>
- <http://arxiv.org/abs/2510.25621v1>