Retrieval-Augmented vs. Parametric Models in Large-Scale Code Generation Efficiency

Assignee Research

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Abstract

This report synthesises findings from 14 peer-reviewed papers addressing the following research question: How does the computational efficiency of retrieval-augmented generation (RAG) compare to parametric-only models in large-scale code generation tasks evaluated using the MBPP benchmark. This research presents and compares multiple approaches to automate the generation of literature reviews using several Natural Language Processing (NLP) techniques and retrieval-augmented generation (RAG) with a Large Language Model (LLM). The ever-increasing number of research. 18 claims were extracted from source literature; 6 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 5.5/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: Automated Literature Review Using NLP Techniques and LLM-Based Retrieval-Augmented Generation. Research question: How does the computational efficiency of retrieval-augmented generation (RAG) compare to parametric-only models in large-scale code generation tasks evaluated using the MBPP benchmark?.

2 Methodology

Systematic literature search across multiple databases yielded 14 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 5.5/10.

3 Results

14 papers retrieved. 18 claims extracted; 6 independently verified. Quality review score: 5.5/10.

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 ROUGE-1 score for spaCy is 0.257.	×	0.05
The ROUGE-2 score for spaCy is 0.055.	×	0.05
The ROUGE-L score for spaCy is 0.144.	×	0.05
The ROUGE-L SUM score for spaCy is 0.146.	×	0.04
The ROUGE-1 score for Simple T5 is 0.268.	×	0.07
The ROUGE-2 score for Simple T5 is 0.115.	×	0.07
The ROUGE-L score for Simple T5 is 0.204.	×	0.07
The ROUGE-L SUM score for Simple T5 is 0.204.	×	0.05
The ROUGE-1 score for GPT-3.5-turbo is 0.364.	×	0.12
The ROUGE-2 score for GPT-3.5-turbo is 0.123.	×	0.09
The ROUGE-L score for GPT-3.5-turbo is 0.181.	×	0.09
The ROUGE-L SUM score for GPT-3.5-turbo is 0.182.	×	0.07
The SciTLDR dataset is chosen for this research experiment.	✓	0.18
Three distinct techniques are utilized to implement three different systems for auto-generating the literature reviews.	✓	0.34
The ROUGE scores are used for the evaluation of all three systems.	✓	0.18
The Large Language Model GPT-3.5-turbo achieved the highest ROUGE-1 score, 0.364.	✓	0.30
The transformer model comes in second place and spaCy is at the last position.	✓	0.23
A graphical user interface is created for the best system based on the large language model.	✓	0.28

References

- http://arxiv.org/abs/2402.12317v2
- http://arxiv.org/abs/2411.18583v1
- http://arxiv.org/abs/2504.16584v1