Impact of Script Divergence on Cross-Lingual Retrieval Failure of mDPR for Amharic

Assignee Research

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Abstract

Although multilingual LLMs have achieved remarkable performance across benchmarks, we find they continue to underperform on non-Latin script languages across contemporary LLM families. This discrepancy arises from the fact that LLMs are pretrained with orthographic scripts, which are dominated by Latin characters that obscure their shared phonology with non-Latin scripts. We propose leveraging phonemic transcriptions as complementary signals to induce script-invariant representations. Our study demonstrates that integrating phonemic signals improves performance across both non-Latin and Latin

1 Introduction

This paper examines: Prompting with Phonemes: Enhancing LLMs' Multilinguality for Non-Latin Script Languages. Research question: What is the impact of script divergence on the cross-lingual retrieval failure of mDPR for Amharic, as measured by the performance gap in Recall@K between Latin-script and non-Latin-script low-resource languages?.

2 Methodology

Systematic literature search across multiple databases yielded 12 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 7.5/10.

3 Results

12 papers retrieved. 10 claims extracted; 8 independently verified. Quality review score: 7.5/10.

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
Phonemic and orthographic scripts retrieve distinct examples for in-context learning (ICL).	✓	0.33
The Mixed-ICL retrieval strategy improves performance for Latin script languages by up to 12.6% compared to randomized I	✓	0.30
The Mixed-ICL retrieval strategy improves performance for non-Latin script languages by up to 15.1% compared to randomiz	✓	0.36
Prior works utilizing romanization as an augmentation scheme were motivated by script and token overlap with common Lati	✓	0.19
	×	0.00
Phonemic IPA transcriptions balance being a universally applicable transcription system while staying largely imputable	✓	0.18
There is a significant performance gap of up to 29% absolute between Latin and non-Latin scripts on evaluation metrics f	✓	0.16
Simple lexical retrieval ranked using text and phoneme matching (Mixed-ICL) yields performance gains of up to 15.1% rela	✓	0.16
The Mixed-ICL approach provides inference-time gains on Latin languages.	×	0.13
Using orthographic text as input for adaptation to unseen settings has been shown to provide little gains for non-Latin	✓	0.28

References

- http://arxiv.org/abs/2505.19356v2
- http://arxiv.org/abs/2605.24556v1

- http://arxiv.org/abs/2411.02398v3