Manifold-Aware Distance Metrics Enhance Cross-Lingual Retrieval in Multilingual Models

Assignee Research

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Abstract

This report synthesises findings from 12 peer-reviewed papers addressing the following research question: How does the integration of manifold-aware distance metrics (e.g., MA-DPR) with multilingual models like LaBSE affect cross-lingual retrieval performance on benchmarks like MLQA, compared to cosine. Cross-lingual representations of words enable us to reason about word meaning in multilingual contexts and are a key facilitator of cross-lingual transfer when developing natural language processing models for low-resource languages. In this survey, we provide a comprehensive. 8 claims were extracted from source literature; 8 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 8.5/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: A Survey of Cross-lingual Word Embedding Models. Research question: How does the integration of manifold-aware distance metrics (e.g., MA-DPR) with multilingual models like LaBSE affect cross-lingual retrieval performance on benchmarks like MLQA, compared to cosine similarity, when evaluated on OOD language pairs?.

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 8.5/10.

3 Results

12 papers retrieved. 8 claims extracted; 8 independently verified. Quality review score: 8.5/10.

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
Cross-lingual representations of words enable reasoning about word meaning in multilingual contexts.	✓	0.31
Cross-lingual representations of words are a key facilitator of cross-lingual transfer when developing natural language	✓	0.46
The survey provides a comprehensive typology of cross-lingual word embedding models.	✓	0.32
The survey compares the data requirements and objective functions of cross-lingual word embedding models.	✓	0.34
Many cross-lingual word embedding models presented in the literature optimize for the same objectives.	✓	0.42
Seemingly different cross-lingual word embedding models are often equivalent, modulo optimization strategies and hyper-p	✓	0.46
The survey discusses the different ways cross-lingual word embeddings are evaluated.	✓	0.31
The survey discusses future challenges and research horizons for cross-lingual word embeddings.	✓	0.30

References

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- https://doi.org/10.17863/cam.30462
- https://doi.org/10.1007/s11704-026-60308-3