Impact of Noise in Low-Resource Image-Text Pairs on Multimodal Retrieval Robustness via Optimal Transport Distillation

Assignee Research

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Abstract

Benefiting from transformer-based pre-trained language models, neural ranking models have made significant progress. More recently, the advent of multilingual pre-trained language models provides great support for designing neural cross-lingual retrieval models. However, due to unbalanced pre-training data in different languages, multilingual language models have already shown a performance gap between high and low-resource languages in many downstream tasks. And cross-lingual retrieval models built on such pre-trained models can inherit language bias, leading to suboptimal result for low-reso

1 Introduction

This paper examines: Improving Cross-lingual Information Retrieval on Low-Resource Languages via Optimal Transport Distillation. Research question: What is the impact of noise in low-resource language image-text pairs on the robustness of multimodal retrieval models trained with optimal transport distillation, as measured by accuracy on the Flickr30k Entities dataset?.

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 8.6/10.

3 Results

14 papers retrieved. 15 claims extracted; 15 independently verified. Quality review score: 8.6/10.

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
CAL significantly outperforms strong baselines on low-resource languages, including neural machine translation.	✓	0.21
WikiCLIR is a large cross-lingual retrieval collection based on the linked foreign language articles from Wikipedia page	✓	0.23
The cross-lingual contents in WikiCLIR are of high quality because the Wikipedia articles in a specific language are edi	✓	0.26
The relevant judgments in WikiCLIR are synthetically generated based on mutual links across pages.	✓	0.17
mMARCO is a multilingual passage ranking dataset built by translating the queries and passages in MS MARCO into the targ	✓	0.27
The relevant judgments in mMARCO are more credible than WikiCLIR because MS MARCO is generated from query log.	✓	0.21
The automatically generated cross-lingual contents created by NMT models are not comparable to human writers, especially	✓	0.30
OPTICAL is a novel Optimal Transport-based knowledge distillation framework for low-resource CLIR task.	✓	0.23
OPTICAL formulates the cross-lingual token alignment task as an optimal transport problem to learn from a well-trained m	✓	0.29
OPTICAL only needs bitext data for distillation training, which is more feasible for low-resource languages.	✓	0.28
The distillation training in OPTICAL is formulated as an optimal transport problem where the cost matrix is the cross-li	✓	0.31
The loss in OPTICAL is defined as the Frobenius inner product of the transportation plan and the cost matrix.	✓	0.23
The teacher model in OPTICAL already learns the knowledge of query-document matching, and the distillation training only	✓	0.32
Experiments were performed on seven language pairs for CLIR training and evaluation, including four low-resource languag	✓	0.28
OPTICAL significantly outperforms several strong baseline methods on low-resource languages in terms of mean average pre	✓	0.29

References

- http://arxiv.org/abs/2403.13480v1
- http://arxiv.org/abs/2301.12566v1
- http://arxiv.org/abs/2412.10008v1