Diversity in Training Languages for Dense Retrieval and Zero-Shot Accuracy in Low-Resource Benchmarks

Assignee Research

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Abstract

Accuracy of English-language Question Answering (QA) systems has improved significantly in recent years with the advent of Transformer-based models (e.g., BERT). These models are pre-trained in a self-supervised fashion with a large English text corpus and further fine-tuned with a massive English QA dataset (e.g., SQuAD). However, QA datasets on such a scale are not available for most of the other languages. Multi-lingual BERT-based models (mBERT) are often used to transfer knowledge from high-resource languages to low-resource languages. Since these models are pre-trained with huge text corp

1 Introduction

This paper examines: MuCoT: Multilingual Contrastive Training for Question-Answering in Low-resource Languages. Research question: How does increasing the diversity of training languages in dense retrieval models affect zero-shot accuracy on low-resource non-English benchmarks compared to high-resource language performance?.

2 Methodology

Systematic literature search across multiple databases yielded 15 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 8.2/10.

3 Results

15 papers retrieved. 19 claims extracted; 16 independently verified. Quality review score: 8.2/10.

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 ChAII dataset contains 1,114 records of context, question, answer, and its corresponding start position in the conte	✓	0.26
Hindi is represented predominantly in the ChAII dataset with nearly two-thirds of the records.	✓	0.20
The complete test dataset of ChAII has not been disclosed to the public as it is part of an ongoing Kaggle competition.	✓	0.18
The test split from the ChAII training data was created using Scikit-learn's train_test_split method with a test size of	✓	0.21
The validation split of 100 samples was obtained by applying the same train_test_split method over the filtered train sp	✓	0.16
Translations and transliterations of the ChAII training split were used as augmented samples for fine-tuning the QA mode	✓	0.16
The Stanford Question Answering Dataset (SQuAD) contains 100K records of answerable question-answer pairs along with the	✓	0.19
SQuAD was used to pre-train the QA head added to the pre-trained mBERT model.	✓	0.21
AI4Bharat's IndicTrans2 was used for translation, achieving BLEU scores of 37.9 for Hindi to English and 28.6 for Tamil	×	0.14
BLEU scores for translating English to Bengali, Marathi, Malayalam, and Telugu are 20.3, 16.1, 16.3, and 22.0, respectiv	✓	0.32
Nearly 500 of the ChAII instances could not be translated to English due to inconsistent translations of the same word i	×	0.12
Nearly another 200 instances were lost when translating from English to other Indian languages for the same reason.	✓	0.21
The open-source Indic-trans transliteration module was used for transliteration, supporting many Indian language scripts	✓	0.22
Transliteration was performed from Hindi and Tamil to Bengali, Marathi, Malayalam, and Telugu.	✓	0.17
The ChAII dataset is noisy, leading to the use of translation and transliteration as data augmentation strategies.	×	0.13
The mBERT-QA model was fine-tuned and evaluated for Indian languages Tamil and Hindi using the ChAII dataset.	✓	0.25
The mBERT-QA model was pre-trained using SQuAD, a large-scale question answering dataset in English.	✓	0.20
Fine-tuning the mBERT-QA model using only	✓	0.28

References

- http://arxiv.org/abs/2104.08757v2
- http://arxiv.org/abs/2412.10008v1
- http://arxiv.org/abs/2204.05814v1