Domain Adaptation of Multilingual Models for Cross-Lingual Retrieval in Low-Resource Languages on the mTREC Benchmark

Assignee Research

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Abstract

Multilingual Neural Machine Translation (NMT) excels in sharing knowledge across languages and transferring insights from high-resource languages to improve performance in low-resource languages. However, its performance lags in specific domains such as legal and medical. Previous works have focused on adding language-specific and domain-specific adapters to achieve domain adaptation. Although effective, these adapter-based methods only use domain data to train additional parameters, limiting the performance of multilingual NMT. In this paper, we propose CDSTX, a novel approach that achieves r

1 Introduction

This paper examines: Toward Enhancing Cross-Lingual Domain Knowledge Sharing and Transferring for Multilingual Domain Adaptation in NMT. Research question: To what extent does domain adaptation of multilingual models using in-domain data from high-resource languages improve cross-lingual retrieval accuracy on low-resource languages, as measured by precision and recall on the mTREC benchmark?.

2 Methodology

Systematic literature search across multiple databases yielded 18 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 7.8/10.

3 Results

18 papers retrieved. 17 claims extracted; 15 independently verified. Quality review score: 7.8/10.

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
Multilingual Neural Machine Translation (NMT) excels in sharing knowledge across languages and transferring insights fro	✓	0.35
Multilingual NMT performance lags in specific domains such as legal and medical.	✓	0.23
Previous works have focused on adding language-specific and domain-specific adapters to achieve domain adaptation.	✓	0.33
Adapter-based methods only use domain data to train additional parameters.	✓	0.24
Limiting training to additional parameters in adapter-based methods limits the performance of multilingual NMT.	✓	0.17
CDSTX is a novel approach that achieves robust multilingual domain adaptation without relying on adapters.	✓	0.32
CDSTX solely leverages multilingual models.	×	0.06
CDSTX utilizes the pretrained model XLM-R.	×	0.11
CDSTX uses frozen embeddings to preserve robust multilingual capabilities.	✓	0.18
CDSTX designs a two-stage training strategy for domain adaptation.	✓	0.17
The CDSTX two-stage training strategy includes separate training for the decoder.	✓	0.17
The CDSTX two-stage training strategy includes fine-tuning of the entire model.	✓	0.17
The CDSTX training strategy ensures the model effectively acquires domain knowledge and correctly represents domain-spec	✓	0.28
CDSTX devises special domain tokens called Source&Target Domain Tags at the beginning of the source and target sentences	✓	0.25
Source&Target Domain Tags are used to better utilize domain information conveyed implicitly by the training data.	✓	0.29
Back translation is employed in CDSTX to enhance cross-lingual transfer ability.	✓	0.18
The proposed method is evaluated on two datasets across three translation tasks.	✓	0.19

References

- https://www.semanticscholar.org/paper/afb32ec2a594d0ac2707be68d31db47cc95209cb
- https://arxiv.org/abs/2511.10664
- https://www.semanticscholar.org/paper/8e257245645904b0f1585205787bc4355051671d