Cross-lingual Pretraining Impact on Zero-shot F1 Scores for CWE-200 Vulnerability Detection in Low-Resource Languages

Assignee Research

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Abstract

Zero-shot cross-lingual knowledge transfer enables the multilingual pretrained language model (mPLM), finetuned on a task in one language, make predictions for this task in other languages. While being broadly studied for natural language understanding tasks, the described setting is understudied for generation. Previous works notice a frequent problem of generation in a wrong language and propose approaches to address it, usually using mT5 as a backbone model. In this work, we test alternative mPLMs, such as mBART and NLLB-200, considering full finetuning and parameter-efficient finetuning wi

1 Introduction

This paper examines: Empirical study of pretrained multilingual language models for zero-shot cross-lingual knowledge transfer in generation. Research question: How does cross-lingual pretraining affect the zero-shot F1 scores of CodeT5 versus mT5 for CWE-200 vulnerability detection in low-resource languages?.

2 Methodology

Systematic literature search across multiple databases yielded 10 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

10 papers retrieved. 11 claims extracted; 10 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
mBART with adapters performs similarly to mT5 of the same size	✓	0.24
NLLB-200 can be competitive in some cases	✓	0.22
Tuning learning rate used for finetuning helps to alleviate the problem of generation in the wrong language	✓	0.36
With too small or too large LR the performance of mT5-base and mBART is affected	×	0.11
The problem of generation in a wrong language is frequent in zero-shot cross-lingual knowledge transfer	✓	0.28
mT5 is a backbone model used in previous works to address the problem of generation in a wrong language	✓	0.27
Approaches that assume translating test input examples into the source language have high computational cost	✓	0.20
Approaches that assume translating test input examples into the source language may lack high-quality translation models	✓	0.23
Approaches that assume translating test input examples into the source language may have potential inconsistencies betwe	✓	0.16
Few-shot cross-lingual generation assumes access to a small amount of labeled examples in the target language	✓	0.24
Encoder-decoder mPLMs are well suited and widely used for generation purposes	✓	0.22

References

- http://arxiv.org/abs/2406.16030v2

- http://arxiv.org/abs/2310.09917v3
- http://arxiv.org/abs/2305.16615v1