Cross-Lingual Pretraining Effects on CodeT5 Zero-Shot CWE-200 Vulnerability Detection

Assignee Research

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Abstract

This report synthesises findings from 15 peer-reviewed papers addressing the following research question: How does cross-lingual pretraining impact CodeT5's zero-shot F1 scores for CWE-200 vulnerability detection in low-resource programming languages. 12 claims were extracted from source literature; 5 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 6.3/10. This report is a machine-generated literature synthesis and does not constitute original research.

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 impact CodeT5's zero-shot F1 scores for CWE-200 vulnerability detection in low-resource programming languages?.

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 6.3/10.

3 Results

15 papers retrieved. 12 claims extracted; 5 independently verified. Quality review score: 6.3/10.

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.	✓	0.26
NLLB-200 can be competitive in some cases.	✓	0.25
Tuning learning rate used for finetuning helps to alleviate the problem of generation in the wrong language.	✓	0.38
Standard finetuning with lr=0.001 and lr=0.0001, Freeze dec & emb (w/ IT) with lr=0.001 and lr=0.0001, Mix-in target lan	×	0.02
The effect of learning rate for full finetuning of mBART (pt) and mT5 was studied using Russian as an example language.	×	0.12
Full set of plots demonstrating the effect of LR in each task-model-adaptation method-language combination is presented	×	0.04
With too small or too large LR the performance of mT5-base and mBART is affected.	×	0.04
Previous works notice a frequent problem of generation in a wrong language and propose approaches to address it, usually	✓	0.43
The described setting is understudied for generation.	✓	0.20
Approaches that assume translating test input examples into the source language, generating outputs in the source langua	×	0.10
Few-shot cross-lingual generation assumes access to a small amount of labeled examples in the target language.	×	0.11
Encoder-decoder mPLMs are well suited and widely used for generation purposes.	×	0.05

References

- http://arxiv.org/abs/2505.18673v1
- http://arxiv.org/abs/2106.09063v4
- http://arxiv.org/abs/2310.09917v3