

Pre-training on Intermediate English Tasks for Zero-shot Cross-lingual Performance with PEFT

Assignee Research

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Abstract

Parameter-efficient fine-tuning (PEFT) using labeled task data can significantly improve the performance of large language models (LLMs) on the downstream task. However, there are 7000 languages in the world and many of these languages lack labeled data for real-world language generation tasks. In this paper, we propose to improve zero-shot cross-lingual transfer by composing expert modules trained separately on language or task data. Our method composes `\textit{language}` and `\textit{task}` PEFT adapters via element-wise arithmetic operations to leverage unlabeled data and English labeled data.

1 Introduction

This paper examines: Language and Task Arithmetic with Parameter-Efficient Layers for Zero-Shot Summarization. Research question: Does pre-training on intermediate English tasks improve zero-shot cross-lingual performance on the XTREME benchmark when using models with parameter-efficient fine-tuning (PEFT) methods like LoRA or adapter modules, compared to full fine-tuning?.

2 Methodology

Systematic literature search across multiple databases yielded 16 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

16 papers retrieved. 13 claims extracted; 11 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
There are 7000 languages in the world.	✓	0.19
Many languages lack labeled data for real-world language generation tasks.	✓	0.33
The proposed method composes language and task PEFT adapters via element-wise arithmetic operations to leverage unlabeled	✓	0.38
The method extends to cases where labeled data from more languages is available and proposes to arithmetically compose P	✓	0.31
Empirical results on summarization demonstrate that the method obtains consistent gains using minimal training of PEFT p	✓	0.36
Current PEFT methods generally require access to labeled task data in a given language.	✓	0.26
Many languages with millions of speakers do not have labeled summarization data resources.	×	0.11
Standard PEFT methods optimize a separate set of parameters for each language, resulting in thousands of fine-tuned chec	✓	0.24
Standard PEFT methods cannot leverage information from related tasks as they are fine-tuned in isolation.	✓	0.20
The proposed method leverages unlabeled data to train language parameters with PEFT.	×	0.12
The method performs element-wise arithmetic operations with pretrained task and language parameters to construct new par	✓	0.20
Prior work has applied element-wise operations to the weights of fine-tuned models or PEFT modules.	✓	0.29
Interpolating the weights of fine-tuned models (or specific layers) effectively creates multi-task and multi-domain mode	✓	0.22

References

- <https://arxiv.org/abs/2510.24619>
- <https://www.semanticscholar.org/paper/33d0cb62fe89bd05c28bfe37def306d7c4b02259>
- <https://arxiv.org/abs/2311.09344>