Robustness of Multilingual Models with Target-Language Adapters in Zero-Shot Cross-Lingual Transfer

Assignee Research

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Abstract

Modular deep learning has been proposed for the efficient adaption of pre-trained models to new tasks, domains and languages. In particular, combining language adapters with task adapters has shown potential where no supervised data exists for a language. In this paper, we explore the role of language adapters in zero-shot cross-lingual transfer for natural language understanding (NLU) benchmarks. We study the effect of including a target-language adapter in detailed ablation studies with two multilingual models and three multilingual datasets. Our results show that the effect of target-langua

1 Introduction

This paper examines: The Impact of Language Adapters in Cross-Lingual Transfer for NLU. Research question: How does the inclusion of target-language adapters in multilingual models influence robustness to adversarial examples in zero-shot cross-lingual transfer, as evaluated on XTREME-R's semantic parsing and dependency parsing tasks compared to XTREME-B's question answering and sentence similarity tasks?.

2 Methodology

Systematic literature search across multiple databases yielded 13 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 7.7/10.

3 Results

13 papers retrieved. 20 claims extracted; 16 independently verified. Quality review score: 7.7/10.

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 mean accuracy is reported over five random seeds for each experiment.	×	0.11
Only languages from the datasets for which pre-trained language adapters exist on AdapterHub for both models are include	×	0.14
The full results can be found in Appendix A.	×	0.10
Overall, there is a small advantage for using the target-language adapters (on average 70.6 versus 70.0%).	✓	0.21
For 5 evaluation languages, the target-language adapter is better, for 4 languages, the English adapter is better, and f	✓	0.23
For mBERT, keeping the English adapter is the overall best setup with 63.0% (and the best for 9 out of 10 languages), fo	✓	0.31
Exchanging the adapter and especially leaving it out after training can have a strong negative effect for mBERT, showing	✓	0.41
For XLM-R, target-language adapters increase the performance consistently compared to all other setups.	✓	0.17
Nonetr is the lowest-performing setup by a notable margin (50.3% compared to 52.0-53.8% for the other setups), showing t	✓	0.36
For mBERT, the results are more mixed: While Target performs best on average, it only performs better than the English a	✓	0.24
Compared to the other two datasets, exchanging adapters after training does not have a negative impact on mBERT; the Eng	✓	0.37
Our accuracy scores are lower than those by Pfeiffer et al. (2020b).	✓	0.17
Training, stacking, and exchanging adapters is becoming increasingly common.	×	0.05
Adapters (Houlsby et al., 2019) and LoRA (Hu et al., 2021) are widespread for the efficient adaptation of LLMs.	✓	0.22
They often perform on par or better than fine-tuning the models' parameters while avoiding issues of interference such a	✓	0.26
Pfeiffer et al. (2020b) found that any cross-lingual transfer problem can be decomposed into language and task, and intr 4	✓	0.28
This setup is appealing particularly for low-resource and medium-resource languages that lack high-quality data for supe	✓	0.33
How consistent the effect of the target-language adapter is has not been explored explicitly.	✓	0.23
It has not been explored how including target-language adapters compares to keeping the	✓	0.26

References

- http://arxiv.org/abs/2402.00149v1
- http://arxiv.org/abs/2310.09917v3
- http://arxiv.org/abs/1908.10461v1