Domain Adaptation in Low-Resource Perso-Arabic ASR with XLSR-53 Pre-Training

Assignee Research

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Abstract

Self-supervised pre-training could effectively improve the performance of low-resource automatic speech recognition (ASR). However, existing self-supervised pre-training are task-agnostic, i.e., could be applied to various downstream tasks. Although it enlarges the scope of its application, the capacity of the pre-trained model is not fully utilized for the ASR task, and the learned representations may not be optimal for ASR. In this work, in order to build a better pre-trained model for low-resource ASR, we propose a pre-training approach called wav2vec-S, where we use task-specific semi-supe

1 Introduction

This paper examines: Wav2vec-S: Semi-Supervised Pre-Training for Low-Resource ASR. Research question: What is the impact of domain adaptation on the WER of low-resource Perso-Arabic ASR models when pre-trained with multilingual self-supervised models (e.g., XLSR-53) and fine-tuned on domain-specific labeled data?.

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 7.5/10.

3 Results

15 papers retrieved. 9 claims extracted; 7 independently verified. Quality review score: 7.5/10.

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
wav2vec-S achieves an average relative WER reduction of 24.5% for 1h fine-tuning.	×	0.14
wav2vec-S achieves an average relative WER reduction of 6.6% for 10h fine-tuning.	×	0.15
Semi-supervised pre-training can improve the performance and generalization of the self-supervised pre-trained model, i.	✓	0.31
Character-level supervision is better than phone-level for monolingual semi-supervised pre-training even on a cross-ling	✓	0.32
Monolingual semi-supervised pre-training has a trade-off between performance of the source language and other languages.	✓	0.26
The semi-supervised pre-training step costs much less time than self-supervised pre-training.	✓	0.30
Semi-supervised pre-training effectively improves different self-supervised pre-trained models, e.g., wav2vec 2.0 [1], d	✓	0.24
Semi-supervised pre-training closes the representation gap between the pre-trained and fine-tuned models.	✓	0.22
The pre-training (source) dataset is LibriSpeech [28], where the 100h clean subset is used.	✓	0.24

References

- http://arxiv.org/abs/2109.05494v2
- http://arxiv.org/abs/2208.05445v1
- http://arxiv.org/abs/2110.04484v2