Correlation Between Representation Quality of Semi-Supervised Models and Downstream Word Error Rate in Low-Resource Languages

Assignee Research

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Abstract

Although supervised deep learning has revolutionized speech and audio processing, it has necessitated the building of specialist models for individual tasks and application scenarios. It is likewise difficult to apply this to dialects and languages for which only limited labeled data is available. Self-supervised representation learning methods promise a single universal model that would benefit a wide variety of tasks and domains. Such methods have shown success in natural language processing and computer vision domains, achieving new levels of performance while reducing the number of labels

1 Introduction

This paper examines: Self-Supervised Speech Representation Learning: A Review. Research question: How does the representation quality of semi-supervised pre-trained models correlate with downstream word error rate reductions in low-resource language scenarios?.

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 9.1/10.

3 Results

13 papers retrieved. 9 claims extracted; 9 independently verified. Quality review score: 9.1/10.

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
Supervised deep learning has necessitated the building of specialist models for individual tasks and application scenari	✓	0.32
It is difficult to apply supervised deep learning to dialects and languages with limited labeled data.	✓	0.23
Self-supervised representation learning methods have shown success in natural language processing and computer vision do	✓	0.32
Self-supervised methods in NLP and computer vision have achieved new levels of performance while reducing the number of	✓	0.27
Speech representation learning progress is categorized into three main types: generative, contrastive, and predictive me	✓	0.20
Some self-supervised speech representation approaches rely on multi-modal data for pre-training, mixing text or visual d	✓	0.38
Self-supervised speech representation is closely related to acoustic word embedding and learning with zero lexical resou	✓	0.32
Acoustic word embedding and learning with zero lexical resources have seen active research for many years.	✓	0.26
Many current self-supervised speech representation methods focus solely on automatic speech recognition as a downstream	✓	0.35

References

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- https://doi.org/10.1109/jstsp.2022.3207050
- https://doi.org/10.1613/jair.1.11640