Explicit Phoneme Alignment in UniSpeech Representations for Noisy Multilingual ASR Robustness

Assignee Research

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Abstract

This report synthesises findings from 12 peer-reviewed papers addressing the following research question: What is the effect of explicit phoneme alignment in UniSpeech-derived representations on robustness to noisy speech conditions when evaluated on standard multilingual ASR test sets. 13 claims were extracted from source literature; 13 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 8.7/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: Self-Supervised Speech Representation Learning: A Review. Research question: What is the effect of explicit phoneme alignment in UniSpeech-derived representations on robustness to noisy speech conditions when evaluated on standard multilingual ASR test sets?.

2 Methodology

Systematic literature search across multiple databases yielded 12 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 8.7/10.

3 Results

12 papers retrieved. 13 claims extracted; 13 independently verified. Quality review score: 8.7/10.

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
Supervised deep learning has revolutionized speech and audio processing.	✓	0.22
Supervised deep learning necessitates the building of specialist models for individual tasks and application scenarios.	✓	0.24
It is difficult to apply supervised deep learning to dialects and languages for which only limited labeled data is avail	✓	0.25
Self-supervised representation learning methods promise a single universal model that would benefit a wide variety of ta	✓	0.35
Self-supervised representation learning methods have shown success in natural language processing and computer vision do	✓	0.32
Self-supervised representation learning methods achieve new levels of performance while reducing the number of labels re	✓	0.32
Speech representation learning is experiencing progress in three main categories: generative, contrastive, and predictiv	✓	0.29
Other approaches for speech representation learning rely on multi-modal data for pre-training, mixing text or visual dat	✓	0.34
Self-supervised speech representation is still a nascent research area.	✓	0.28
Self-supervised speech representation is closely related to acoustic word embedding and learning with zero lexical resou	✓	0.31
Acoustic word embedding and learning with zero lexical resources have seen active research for many years.	✓	0.28
Many current methods for self-supervised speech representation learning focus solely on automatic speech recognition as	✓	0.33
Recent efforts have been made on benchmarking learned representations to extend the application of self-supervised speec	✓	0.33

References

- https://doi.org/10.48550/arxiv.2305.00359
- https://doi.org/10.1109/taslp.2024.3444456
- https://doi.org/10.1109/jstsp.2022.3207050