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Title:

Comparison of reference-based and single-ended prediction models for perceived listening effort

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Abstract:

This study presents a comparative analysis of two prediction models for perceived listening effort: the standardized model according to ETSI TS 103 558, referred to as "Assessment of Binaural Listening Effort" (ABLE), and a novel single-ended model, "Listening Effort Prediction from Acoustic Parameters" (LEAP). Although developed for different use cases, there are several overlapping scenarios that would be applicable to both models.

ABLE utilizes both a binaural recording and the original reference signal as input for the prediction. It was trained on a comprehensive set of listening test databases and was formally validated across multiple applications. In contrast, LEAP operates without the reference signal, relying solely on the degraded recording. It employs a deep neural network-based automatic speech recognition engine to analyze the phoneme posterior probabilities, capturing the temporal smearing of recognized phonemes.

Listening effort predictions are compared to auditory data unseen to both models, and which contain recordings from typical real-world scenarios. Besides considering consistency, accuracy and robustness, this analysis aims to highlight the trade-offs in performance between reference-based and single-ended approaches, as well as providing insights into their respective strengths and possible limitations.

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